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A COMPUTER PROGRAM FOR RIGID PAVEMENT
EVALUATION

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This document presents a computer program which computes Allowable Gross Loads (AGL's) for various aircraft wheel configurations on rigid airfield pavements. Full program documentation, including flow charts, program listing, and sample output are included.

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FOREWORD

This report summarizes work done between June 1971 and December 1974.
Captain Floyd P. McClellen, USAF, was Project Officer.

This report has been reviewed by the Information Officer (IO) and is
releasable to the National Technical Information Service (NTIS). At
NTIS, it will be available to the general public, including foreign
nations.

Approved for public release; distribution unlimited.

This technical report has been reviewed and is approved.

FLOYD P. MCCLELLEN, Capt, USAF
Project Officer
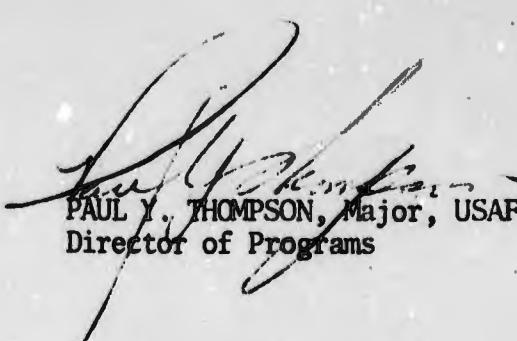
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I. GENERAL DESCRIPTION

A. Purpose:

This program computes Allowable Gross Loads (AGL's) for various aircraft gear configurations on rigid airfield pavements as described in Chapter 3 of AFM 88-24. The program reduces the manhours required for the hand computation from 240 manhours to less than two (2) manhours per average base.

B. Background:

From the beginning of its role in airfield pavement evaluation, the Air Force Civil Engineering Center (AFCEC) has constantly expanded its capabilities for pavement evaluation studies. One of the limitations inherent in such an expansion is the manpower required to accomplish the tasks. The manpower required in the field portion (data collection effort) of the pavement evaluation can only be reduced by advancing the state of the art in pavement evaluations. However, since the data reduction/interpretation effort of these evaluations requires extensive, repetitive hand calculations to reduce the data collected to a form readily interpreted, the manpower required can be reduced by the development of a computer program. As an example, for one pavement feature there are 40 sets of calculations. For an average base, there are normally 30 - 50 pavement features. This results in 1200 - 2000 calculations per average base, with each calculation needing to be checked at least once. The development of a computer program permits the calculations to be performed in minimum time with only a check of the four input items for each feature being studied. The program reduces the time required for the calculations from the approximately 240 manhours per average base to less than 2 manhours using less than 15 seconds of central processor time on a CDC 6600 computer.

C. Discussion:

To determine the load carrying capacity of a rigid airfield system, field and laboratory testing is accomplished to determine the thickness (T) and flexural strength (R) of the Portland Cement Concrete Surfacing, as well as the Modulus of subgrade reaction (K) for the underlying layers. This data using procedures outlined in AFM 88-24, is used to calculate the allowable gross load (AGL's) for various gear configurations. The following is a listing of those steps:

1. Step 1 - Determine T,R,K

2. Step 2 - Determine the traffic areas (Based on AFR 93-5, para 2-4.

3. Step 3 - Look up the radius of relative stiffness (STIFF) (See Figure 1)

4. Step 4 - Look up the evaluation load factor [A (I,J)] based on the correct traffic area and using the above radius of relative stiffness (STIFF) (See Figures 2, 3, & 4)

5. Step 5 - Look up the pavement evaluation index (ALF)(See Figure 5)

6. Step 6 - Multiply the pavement evaluation index from Step 5 times the load factor from step 4. (See equation (1) below). The above process (Steps 4-6) must be accomplished for each of the ten gear configurations. This provides the allowable gross loads for capacity operations as defined by AFR 93-5, para 2-4. The next step is to determine the allowable gross loads for operational categories which provide for fewer operations than capacity operations. These categories are full, minimum and emergency and are defined in AFR 93-5, para 2-4.

7. Step 7 - Determine the appropriate G_f, and FT_i from AFM 88-24, Chapter 3, Appendix I. These values are used in the equations (2), (3), and (4) to compute allowable gross loads for the full, minimum and emergency categories.

The computer goes through the above steps quickly and accurately.

The following equations are used in the program to calculate AGL's:

$$D_{j-1} = \frac{(ALF)(A_{i,j})}{1000} \qquad (1)$$

$$F_i = (1+(G_f)(FT_i))\ (D_i) \qquad (2)$$

$$R_i = (1+(G_r)(FT_i))\ (D_i) \qquad (3)$$

$$E_i = (1+(G_e)(FT_i))\ (D_i) \qquad (4)$$

Where: D_i are the 10 AGL's for the capacity category;

F_i are the 10 AGL's for the full category;

R_i are the 10 AGL's for the minimum category;

E_i are the 10 AGL's for the emergency category;

G_f are the 3 pavement thickness factors for FULL category;

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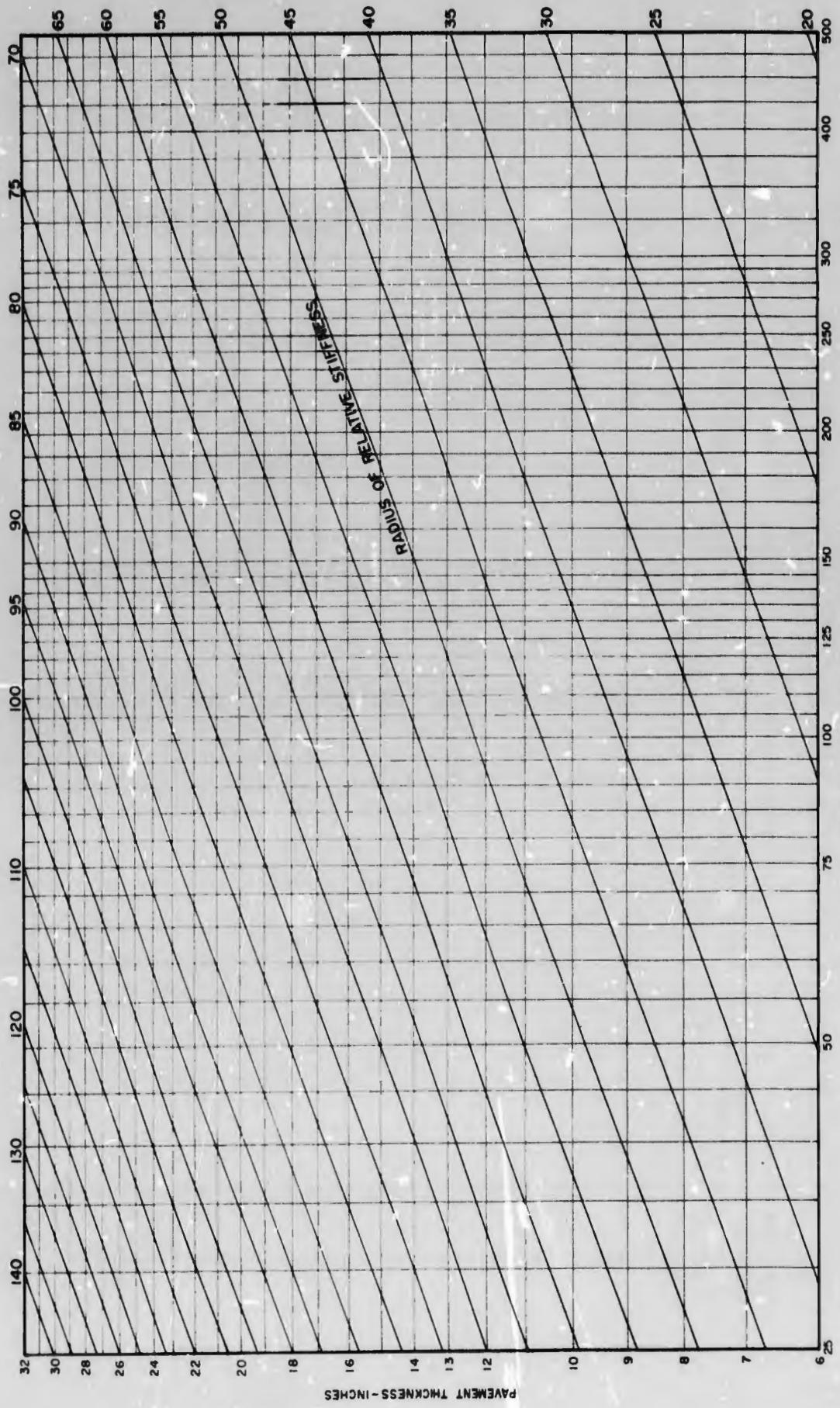
RADIUS OF RELATIVE STIFFNESS

(E = 4.0 × 10⁶ PSI, μ = 0.20)

MODULUS OF SUBGRADE REACTION – LB/in³ (k)

PAVEMENT THICKNESS – INCHES

RADIUS OF RELATIVE STIFFNESS

Figure 1

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RIGID PAVEMENT EVALUATION LOAD FACTORS (TYPE A TRAFFIC AREA)

RADIUS OF RELATIVE STIFFNESS IN	SINGLE WHEEL			MULTIPLE WHEEL						BICYCLE GEAR
					TRICYCLE GEAR					
	100 PSI INFLATION PRESSURE	100 SQ.IN. CONTACT AREA	241 SQ.IN. CONTACT AREA	TWIN WHEEL (28 CC) 226 SQ.IN. TIRE	SINGLE TANDEM (60 CC) 400 SQ.IN. TIRE	TWIN WHEEL (37 CC) 267 SQ.IN. TIRE	TWIN WHEEL (44 CC) 630 SQ.IN. TIRE	TWIN TANDEM (33 x 48) 208 SQ.IN. TIRE	C-5A GEAR CONFIGURATION	TWIN TWIN (37 x 62 x 37) 267 SQ.IN. TIRE
	1	2	3	4 TYPE	5 TRAFFIC	6 AREAS	7	8	9	10
20	—	—	—	—	4590	3350	5310	6360	18020	5580
22	—	—	—	—	4560	3320	5180	6350	18000	5560
24	—	—	—	—	4530	3280	5050	6340	17970	5410
26	—	—	—	—	4500	3250	4920	6330	17920	5330
28	—	—	—	—	4460	3220	4790	6300	17850	5250
30	—	—	—	—	4420	3190	4660	6270	17760	5170
32	—	—	—	—	4370	3160	4540	6230	17760	5100
34	—	—	—	—	4320	3130	4430	6180	17590	5020
36	—	—	—	—	4280	3100	4320	6110	17410	4940
38	—	—	—	—	4230	3070	4230	6020	17250	4870
40	—	—	—	—	4190	3040	4150	5910	17060	4800
42	—	—	—	—	4140	3020	4070	5780	16840	4720
44	—	—	—	—	4090	2990	4000	5650	16610	4660
46	—	—	—	—	4050	2970	3940	5520	16360	4590
48	—	—	—	—	4010	2950	3880	5400	16090	4520
50	—	—	—	—	3970	2930	3820	5280	15820	4450
52	—	—	—	—	3930	2910	3770	5160	15530	4390
54	—	—	—	—	3900	2890	3730	5070	15240	4330
56	—	—	—	—	3870	2870	3690	4970	14970	4280
58	—	—	—	—	3830	2850	3650	4880	14700	4230
60	—	—	—	—	3810	2830	3610	4810	14450	4190
62	—	—	—	—	3780	2800	3580	4740	14200	4130
64	—	—	—	—	3750	2780	3550	4670	13970	4090
66	—	—	—	—	3720	2770	3520	4600	13760	4050
68	—	—	—	—	3700	2750	3500	4540	13550	4010
70	—	—	—	—	3680	2740	3470	4490	13350	3970
72	—	—	—	—	3650	2720	3450	4430	13160	3940
74	—	—	—	—	3630	2710	3430	4370	12970	3900
76	—	—	—	—	3610	2700	3410	4320	12780	3870
78	—	—	—	—	3590	2690	3380	4280	12600	3840
80	—	—	—	—	3570	2670	3360	4240	12420	3810
84	—	—	—	—	3530	2650	3320	4150	12140	3760
88	—	—	—	—	3450	2630	3290	4070	11870	3710
92	—	—	—	—	3410	2610	3250	3990	11620	3670
96	—	—	—	—	3380	2590	3220	3920	11390	3630
100	—	—	—	—	3330	2570	3190	3850	11190	3590
105	—	—	—	—	3280	2560	3150	3780	10990	3550
110	—	—	—	—	3240	2550	3130	3700	10800	3510
115	—	—	—	—	3200	2540	3110	3620	10620	3480
120	—	—	—	—	3160	2540	3090	3560	10450	3450
125	—	—	—	—	3160	2540	3070	3500	10300	3430
130	—	—	—	—	3120	2530	3050	3450	10160	3410
135	—	—	—	—	3090	2530	3040	3400	10040	3390
140	—	—	—	—	3050	2550	3030	3350	9950	3380

$$P = 1.4(f_s \times f_t)$$

Figure 2

RIGID PAVEMENT EVALUATION LOAD FACTORS (TYPE 1 TRAFFIC AREA)

	SINGLE WHEEL			MULTIPLE WHEEL						
				TRICYCLE GEAR						BICYCLE GEAR
RADIUS OF RELATIVE STIFFNESS IN	100 PSI INFLATION PRESSURE	100 SQ IN. CONTACT AREA	241 SQ IN. CONTACT AREA	TWIN WHEEL (28 CC) 226 SQ IN TIRE	SINGLE TANDEM (60 CC) 400 SQ IN TIRE	TWIN WHEEL (37 CC) 267 SQ IN TIRE	TWIN WHEEL (44 CC) 630 SQ IN TIRE	TWIN TANDEM (33 x 48) 208 SQ IN. TIRE	C-5A GEAR CONFIGURATION	TWIN TWIN (37 x 62 x 37) 267 SQ IN. TIRE
	1	2	3	4	5	6	7	8	9	10
20	2090	1500	2120	3430	5420	3590	6180	7440	20810	5940
22	2100	1530	2130	3400	5390	3550	6020	7430	20790	5850
24	2110	1560	2130	3370	5360	3510	5870	7420	20750	5770
26	2120	1580	2140	3340	5320	3470	5720	7410	20690	5650
28	2130	1610	2140	3320	5270		5570	7380	20610	5600
30	2130	1630	2140	3290	5220	3770	5420	7340	20510	5510
32	2140	1650	2150	3260	5170	3730	5280	7290	20400	5430
34	2150	1670	2150	3240	5110	3730	5150	7230	20270	5340
36	2150	1680	2150	3220	5060	3690	5040	7190	20110	5260
38	2160	1700	215x	3200	5000	3660	4930	7090	19920	5190
40	2160	1710	2160	3180	4950	3630	4830	6920	19700	5110
42	2160	1720	2160	3160	4890	3600	4730	6760	19450	5050
44	2160	1730	2160	3140	4840	3570	4640	6610	1918.	4960
46	2170	1740	2160	3120	4790	3540	4570	646.	1.89.	4285
48	2170	1740	2160	3110	4740	3530	4510	632.	18580	4810
50	2170	1750	216	3080	4700	3490	4440	621.	1.36.	4740
52	2170	1760	2160	3070	4650	3460	4380	6050	1795	4680
54	2170	1760	2160	3050	4610	3440	4330	5930	176.	4620
56	2170	1770	2170	3040	4570	3420	4280	5821	1728	456
58	2170	1770	2170	3030	4530	3400	4240	572.	1698.	450
60	2180	1730	2170	3020	4500	3370	4200	563.	1669.	4750
62	2180	1780	2170	3010	4460	3350	4160	551.	1641	446.
64	2180	1790	2170	3000	4430	3330	4130	5460	1611	4358
66	2180	1790	2170	2990	4400	3310	4100	535.	1.69	4.1
68	2180	1800	2170	2980	4370	3300	4070	532.	1.55	4285
70	2180	1800	2170	2970	4350	328.	4040	527.	15:2	4230
72	2180	1810	2170	2960	4320	326.	4010	511.	1532.	419.
74	2180	1810	2170	2950	4290	324.	3980	5320	1498.	415.
76	2180	1820	2170	2940	4270	323.	3960	5060	11.	410
78	2180	1820	2170	2930	4240	320.	3930	501.	11.55	409.
80	2180	1830	2170	2920	4220	320.	3910	497.	11.34	406.
82	2190	1830	217x	2910	4170	317.	3860	487.	1.71.	41.
84	2190	1840	21..	2900	4120	314.	3820	477.	1.71.	394.
88	2190	1840	218x	2890	4080	3.2.	3780	468.	13.2.	3910
92	2150	1850	21..	2880	4030	310.	3740	459.	13.15	3870
96	2190	1850	218	2870	3990	308.	371.	1.21	1292	3.5.
100	2190	1850	2180	2860	3930	306.	369.	442.	1269	3.7.
105	2190	1860	21..	2950	3880	-5.	364.	433.	1247	3.7.
110	2190	1860	21A.	2840	3830	302.	361.	425.	1236	370.
120	2200	1870	2180	2830	3770	303.	359.	41.	120.	367.
125	2200	1870	21..	2820	3740	303.	3570	410	1189.	365.
130	2200	1880	2180	2820	3690	303.	3550	404.	1173.	363.
135	2200	1890	2180	2810	3650	3020	3530	35.	1160	5620
140	2200	1890		2810	3610	3010	3520	352.	11..	3610

Figure 3

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RIGID PAVEMENT EVALUATION LOAD FACTORS (TYPE C TRAFFIC AREA)

	SINGLE WHEEL			MULTIPLE WHEEL						
				TRICYCLE GEAR						BICYCLE GEAR
RADIUS OF RELATIVE STIFFNESS IN	100 PSI INFLATION PRESSURE CONTACT AREA	100 SQ.IN. CONTACT AREA	241 SQ.IN. CONTACT AREA	TWIN WHEEL (28 CC) 226 SQ.IN. TIRE	SINGLE TANDEM (60 CC) 400 SQ.IN. TIRE	TWIN WHEEL (37 CC) 267 SQ.IN. TIRE	TWIN WHEEL (44 CC) 630 SQ.IN. TIRE	TWIN TANDEM (33 x 48) 208 SQ.IN. TIRE	C-5A GEAR CONFIGURATION	TWIN TWIN (37 x 62 x 37) 267 SQ.IN. TIRE
	1	2	3	4	5	6	7	8	9	10
				TYPE	TRAFFIC	AREAS				
20	2790	2000	2830	4570	7230	5320	8240	9920	27740	7920
22	2800	2040	2840	4530	7190	5270	8030	9910	27710	7900
24	2810	2080	2840	4490	7150	5231	7830	9890	27660	7690
26	2830	2110	2850	4450	7090	5160	7630	9880	27580	7520
28	2840	2150	2860	4430	7030	5110	7430	9830	27470	7470
30	2840	2170	2860	4390	6960	5070	7230	9790	27340	7350
32	2850	2200	2860	4350	6890	5030	7040	9720	27190	7240
34	2870	2230	2870	4320	6810	4970	6870	9640	27020	7120
36	2870	2240	2870	4290	6750	4920	6720	9540	26810	7010
38	2880	2270	2870	4270	6670	4880	6570	9400	26550	6920
40	2880	2280	2870	4240	6600	4840	6440	9230	26260	6810
42	2880	2290	2880	4210	6520	4800	6310	9020	25920	6710
44	2880	2310	2880	4190	6450	4760	6190	8810	25570	6610
46	2890	2320	2880	4160	6390	4720	6080	8620	25180	6510
48	2890	2330	2880	4130	6320	4680	6010	8430	24770	6410
50	2890	2350	2880	4110	6260	4650	5920	8240	24340	6320
52	2890	2350	2890	4090	6200	4610	5840	8060	23900	6240
54	2890	2360	2890	4070	6150	4590	5770	7900	23460	6160
56	2890	2360	2890	4050	6090	4560	5710	7760	23030	6080
58	2900	2370	2890	4040	6040	4530	5650	7630	22630	6000
60	2910	2370	2890	4030	6000	4490	5600	7510	22250	5930
62	2910	2390	2890	4010	5950	4470	5550	7390	21870	5870
64	2910	2390	2890	4000	5910	4440	5510	7280	21510	5800
66	2910	2390	2890	3990	5870	4410	5470	7180	21180	5750
68	2910	2400	2890	3970	5830	4400	5430	7090	20860	5690
70	2910	2400	2900	3960	5800	4370	5390	7000	20560	5640
72	2910	2410	2900	3950	5760	4350	5350	6910	20260	5590
74	2910	2410	2900	3930	5720	4320	5310	6830	19970	5530
76	2910	2420	2900	3920	5690	4310	5280	6750	19680	5490
78	2910	2420	2900	3910	5650	4280	5240	6680	19390	5450
80	2910	2430	2900	3890	5630	4270	5210	6620	19120	5410
84	2920	2440	2900	3880	5560	4230	5150	6470	18690	5350
88	2920	2440	2900	3870	5490	4190	5040	6350	18280	5280
92	2920	2450	2900	3850	5440	4160	5010	6230	17890	5210
96	2920	2470	2900	3840	5370	4130	4990	6130	17530	5160
100	2920	2470	2900	3830	5320	4110	4950	6010	17220	5110
105	2920	2470	2900	3810	5240	4080	4910	5890	16910	5050
110	2920	2480	2910	3800	5170	4070	4850	5730	16620	4990
115	2920	2480	2910	3790	5110	4050	4810	5660	16350	4930
120	2920	2490	2910	3770	5040	4040	4790	5550	16090	4890
125	2930	2490		3760	4990	4040	4760	5460	15850	4870
130	2930	2510		3760	4920	4050	4730	5380	15640	4840
135	2930	2520		3750	4870	4030	4710	5300	15460	4830
140	2930	2520		3750	4810	4310	4690	5230	15310	4810

Figure 4

RIGID PAVEMENT EVALUATION INDEX CHART

Figure 5

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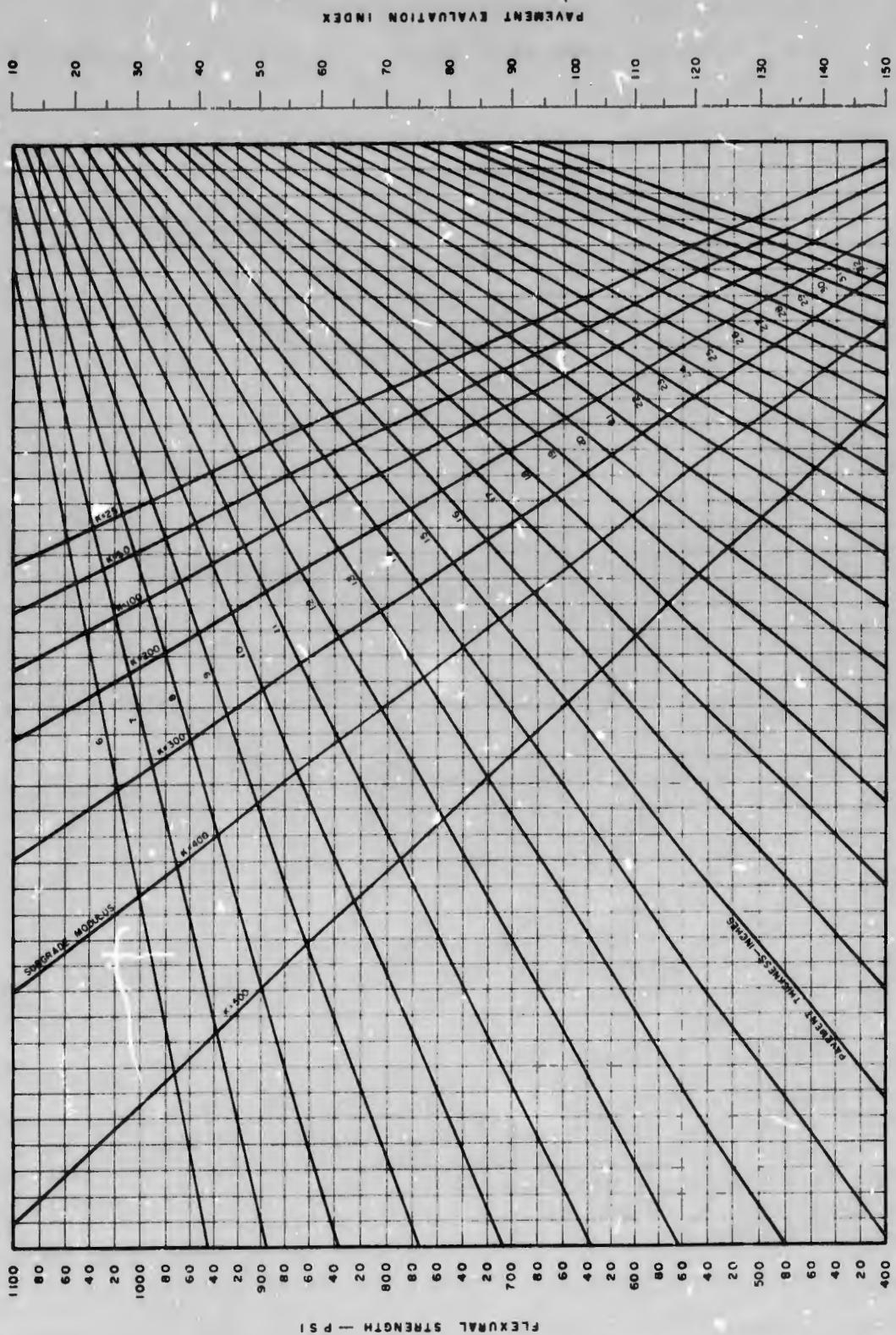
G_f = FA for gear configuration 1 - 4

G_f = FB for gear configuration 10

G_f = FC for gear configuration 5 - 9

G_r are the 3 pavement thickness factors for Minimum category;

G_r = FD for gear configuration 1 - 4

G_r = FE for gear configuration 10

G_r = FF for gear configuration 5 - 9

G_e are the 3 pavement thickness factors for Emergency category;

G_e = FG for gear configuration 1 - 4

G_e = FH for gear configuration 10

G_e = FI for gear configuration 5 - 9

and FT_i are the thickness vs AGL relational factors for each gear configuration and are in the program as data. Depending on the feature, i.e., flexible overlay or rigid pavement, and the flexural strength, the G values are found in stored data within the program.

After the AGL's are computed, the terms are then rounded off in the following manner:

If the AGL is less than 25000 inch-pounds (25 KIPS) round off to the nearest KIP.

If the AGL is between 25 and 300 KIPS, round off to the nearest 5 KIPS.

If the AGL is between 300 and 800 KIPS, round off to the nearest 10 KIPS.

Above 800 KIPS, return a large number (presently set at 10^9). Above 800 KIPS, pavement will withstand any present AF aircraft loading situation.

D. Procedures:

Collection of the data for input to the program is a two-step process. First a pavement evaluation team collects raw data and samples by doing destructive testing and/or sample collection. The collected samples and data are then returned to a soils laboratory to determine specific data to be used as input to this program. The data collected in this manner is then fed into the program for computation of the AGL's.

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E. Limitati ns:

The limitations on the program are as follows:

1. A maximum of 999 features can be run during any given program execution.

2. The program applies to the procedures outlined in AFM 88-24 Chapter 3, and to those aircraft in the AF inventory in 1974.

3. The modulus of subgrade reaction must be between 25 and 500 for rigid pavements or between 50 and 500 for flexible overlays.

4. Thickness must be between 6 and 25 inches, inclusive.

II. DEFINITION OF PROGRAM VARIABLES

A(I,J)   - array containing load factors for A-type features.
          (figure 2)

ALF   - evaluation index
          (figure 5)

ANSR   - yes for flexible overlays (A3 format)*

B(I,J)   - array containing load factors for B-type features.
          (figure 3)

C(I,J)   - array containing load factors for C-type features.
          (figure 4)

D(K)   - array containing AGL's for capacity category (output).

E(K)   - array containing AGL's for emergency category (output).

F(K)   - array containing AGL's for full category (output).

F1(I)   - array containing pavement thickness factors.

G(K)   - array containing thickness versus AGL relational
          factors for each gear configuration

IAREA   - feature type (I2 format) $\emptyset$1 for A, $\emptyset$2 for B, $\emptyset$3 for C*

KM   - modulus of subgrade reaction (I4)*

MA   - number of features (I3)*

R(K)   - array containing AGL's for minimum category (output).

RA   - flexural strength (F7.0)*

STIFF   - radius of relative stiffness

TH   - thickness of pavement (F7.0)*

XT(I,S)   - array containing data used to compute the evaluation
          index (ALF).

YK(I,J)   - array containing data used to compute pavement thick-
          ness factors (F1(K)).

*User supplied.

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III. PROGRAM FLOWCHART

```
                    ⎛   START   ⎞

                    ╱ Read amt. ╲
                   ╱ of features ╲
                   ╲ and flex-   ╱
                    ╲ible status╱

                        ╱╲
                       ╱  ╲
                      ╱ Any╲
                     ╱flexible╲    No
                     ╲overlays╱ ─────────┐
                      ╲  ?  ╱            │
                       ╲  ╱              │
                        ╲╱               │
                      Yes                │
                  ┌──────────┐           │
                  │          │           │
                  │ IFOF = 1 │           │
                  │          │           │
                  └──────────┘           │
    ⎛ 1 ⎞                                │
    ⎝ 1 ⎠ ─────────────────────✳─────────┘

                  ┌──────────┐
                  │          │
                  │ IBOF = 0 │
                  │          │
                  └──────────┘

                   ╱Read & Write╲
                  ╱ Traffic      ╲
                  ╲ Area, K,R,T  ╱
                   ╲and Feat.    ╱
                     ╲ title    ╱

                    ⎛ 2 ⎞
                    ⎝ 1 ⎠
```

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When IBOF=1, all calcs. are handled for flexible overlay.

Block Data contains table values

13
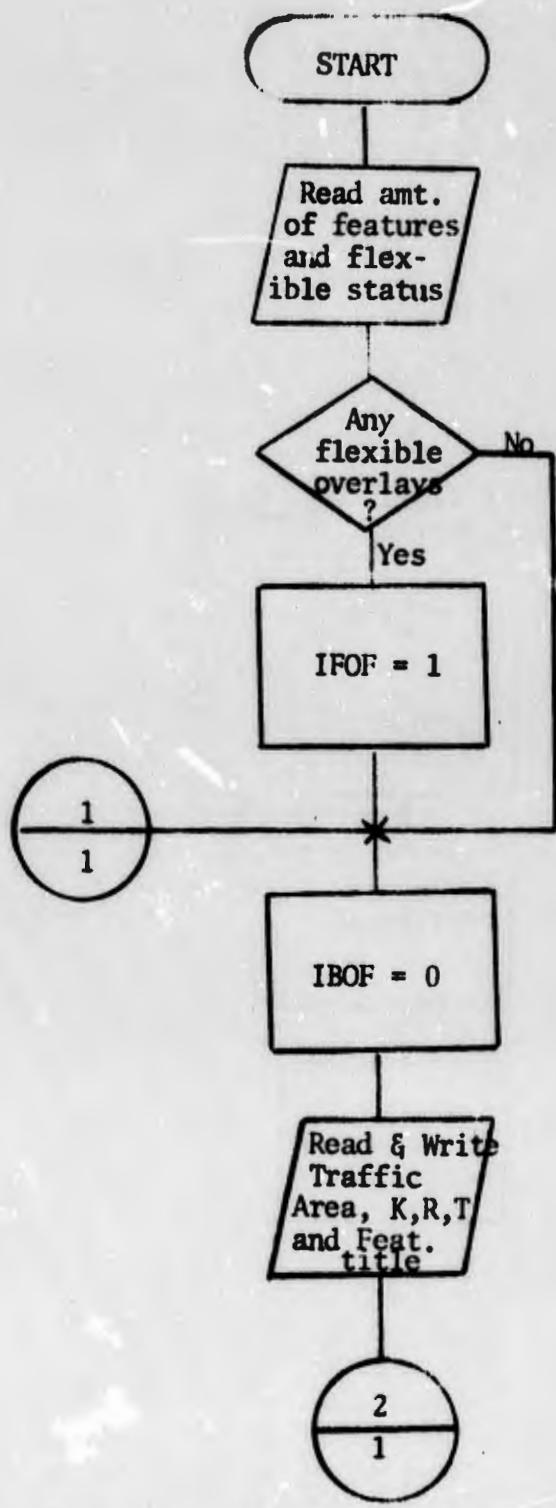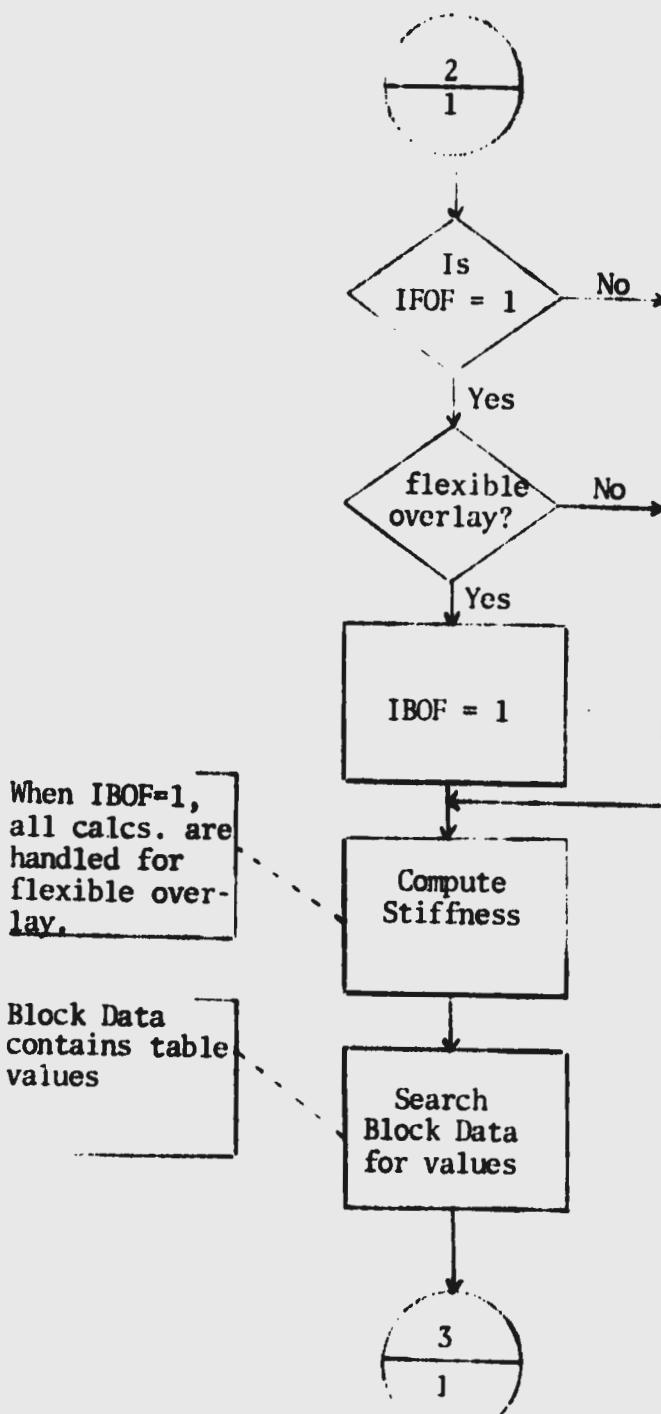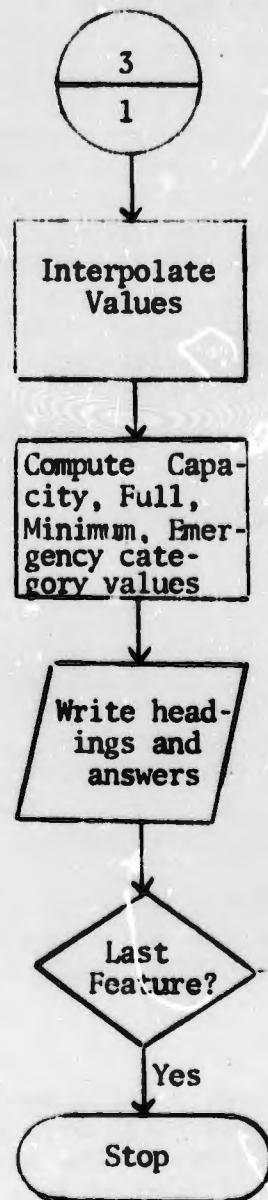
IV. PROGRAM DESCRIPTION

This section is divided into portions dealing with the various routines utilized by the program. The program is written in FORTRAN extended for interactive use. The routines discussed herein are: RIGCAL, RNDOFF, DUB, CHART, FMECAL, FIVALU and BDATA.

A. RIGCAL.

This routine is the main program controlling the logic flow through the computational efforts. Input data is read from an interactive terminal (or file substitution through a batch mode). When used interactively, the program asks the user for input as needed. The input for each feature as well as the Allowable Gross Loads (AGL's) for the feature are written to TAPE 5 with carriage control characters for line printer output. The output format, however, is based on an eighty (80) - Column page. Using various data sets and answers from the questions asked, the program can compute AGL's for both rigid pavements and flexible overlays on rigid pavements. All AGL's are output in KIPS (thousand inch pounds).

The subroutines called by RIGCAL are FIVALU, CHART, FMECAL and RNDOFF.

B. RNDOFF.

This subroutine is used to round off the AGL's under specified guidelines. If the AGL is less than 25 KIPS, round off the nearest KIP. If $25 \leq$ AGL ≤ 300, round off to the nearest 5 KIPS. If $300 \leq$ AGL ≤ 810, round off to the nearest 10 KIPS. This data is then returned to the main program for output. (Note: This routine is not called until all other calculations are completed for a particular test feature.)

This routine calls FUNCTION DUB to perform the specific round off instruction. However, if the AGL is greater than 810 KIPS, RNDOFF returns a number large enough to print an (*) and all $\emptyset$'s.

C. CHART.

This subroutine performs a table search for the correct line of data in one of 3 tables entered through BDATA. An input feature is either A-type, B-type or C-type. The table required is correspondingly A, B, or C. The correct line of data is found from matching the first column of the correct table against the radius of relative stiffness (STIFF) calculated by the main program from input data. Interpolation, if required, is also performed. The values returned are the AGL's for the capacity operational category for the ten gear configurations maintained in the AF inventory (see the definition section for the various categories). No other subroutines are required.

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D. **FMECAL**.

This subroutine computes AGL's for the full, minimum and emergency operational categories as defined in AFR 93-5, para 2-4. All data is transferred through the call statement. No additional subroutines are required.

E. **F1VALU**.

This subroutine performs a table search to find the pavement thickness factors for each gear configuration. The table search uses column 1 for thickness comparisons and interpolates where required. The F1 values found are used by FMECAL to compute AGL's for the full, minimum and emergency operational categories. The table search uses indicies of 1 - 20 for rigid pavements and 21 - 30 for flexible overlays. No other subroutines required.

F. **BDATA**.

This subroutine enters block data into memory through DATA statements.

V. PROGRAM LISTING

```
      PROGRAM RIGCAL(INPUT=129,OUTPUT=129,TAPE1,TAPE4=INPUT,            000100
     1                TAPE5=129,TAPE6=OUTPUT)                           000110
C  THIS PROGRAM CALCULATES THE ALLOWABLE GROSS LOADS OF AIRCRAFT        000120
C  LANDING ON RIGID PAVEMENTS.  THE EVALUATION IS MADE IAW AFM          000130
C  88-24,CHPTR 3.  INPUT REQUIREMENTS ARE THE TYPE OF TRAFFIC           000140
C  AREAS (A,B,C), THE MODULUS OF SUBGRADE REACTION (K), THE FLEX-       000150
C  URAL STRENGTH (R), AND THE THICKNESS OF THE FEATURE TO BE EVALUATED  000160
C  FURTHER INSTRUCTIONS FOR INPUT ARE FURNISHED DURING EXECUTION.       000170
C  THE OUTPUT IS ON THE FILE CALLED TAPE5.  CALL CAPT HANSON AT AUTO-   000180
C  VON 970-2112 OR LT MCCLELLEN AT 970-4212 FOR ADDITIONAL INFO.        000190
      COMMON D(10),R(10),E(10),F(10),ALF,STIFF                          000200
      COMMON /X/G(10)                                                   000210
      COMMON /TABLE/A(44,11),B(44,11),C(44,11),XT(20,6),YK(30,10)       000220
      DIMENSION F1(9)                                                   000230
      DATA (G(I),I=1,10)/1.78,1.92,1.92,1.66,1.29,1.54,1.38,1.34,1.34,1.000240
     X44/                                                               000250
C  MA= # OF FEATS TO BE RUN                                             000260
      T6=5LTAPE4                                                        000270
      T7=5LTAPE6                                                        000280
      CALL CONNEC (T6)                                                  000290
      CALL CONNEC (T7)                                                  000300
      WRITE (6,511)                                                     000310
  511 FORMAT (1X,*INPUT # OF FEATS--USE 3 SPACES-00X THRU XXX*)         000320
      READ 251,MA                                                       000330
      WRITE (6,610)                                                     000340
      IFOF=0                                                            000350
      WRITE (6,940)                                                     000360
  251 FORMAT (I3)                                                       000370
      READ 941,ANSR                                                     000380
  940 FORMAT (* ARE YOU COMPUTING VALUES FOR ANY FLEXIBLE OVERLAY FEAT  000390
     1URES? (YES OR NO)*)                                               000400
  941 FORMAT (A3)                                                       000410
      BANSR=3HYES                                                       000420
      CANSR=1HY                                                         000430
      IF (ANSR.EQ.BANSR) IFOF=1                                         000440
      IF (ANSR.EQ.CANSR) IFOF=1                                         000450
      DO 250 JA=1,MA                                                    000460
      IBOF=0                                                            000470
C  ALF=EVAL IDEX, STIFF=STIFF FACT.  FA THRU FI=F(1) VALUES             000480
      WRITE (6,606)                                                     000490
  606 FORMAT (1X,///* INPUT DATA--FEAT TYPE, K, R AND T*)               000500
      WRITE (6,603)                                                     000510
  603 FORMAT (1X,*USE 2 SP(01,02,03)FOR FEAT TYPE(A,B,C), 4 SP*)        000520
      WRITE (6,608)                                                     000530
  608 FORMAT (1X,*FOR K(0025 THRU 0500) AND 7 SPACES EACH WITH*)        000540
      WRITE (6,621)                                                     000550
  621 FORMAT (1X,*DECIMAL FOR R AND T*)                                 000560
      READ 425,IAREA,KM,RA,TH                                          000570
      WRITE (6,610)                                                     000580
  425 FORMAT (I2,I4,2F7.0)                                              000590
      WRITE (6,607)                                                     000600
  607 FORMAT (1X,/* INPUT FEAT AND BASE INFO--20 SPAC OR LESS*)         000610
      READ 103,FEAT,URE,BASE,INFO                                       000620
      IF (IFOF-1) 944,942,944                                           000630
  942 WRITE (6,943)                                                     000640
  943 FORMAT (* IS THIS FEATURE A FLEXIBLE OVERLAY? (YES,NO)*)          000650
      READ 941,ANSR                                                     000660
      IF (ANSR.EQ.BANSR)IBOF=1                                          000670
      IF (ANSR.EQ.CANSR)IBOF=1                                          000680
  944 IF (KM.GT.500) WRITE (5,505)KM                                    000690
      IF (KM.GT.500) KM=500                                             000700
      IF ((IBOF.EQ.1).AND.(KM.LT.50)) WRITE (5,503)KM                   000710
```

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      IF ((IBOF.EQ.1).AND.(KM.LT.50)) KM=50                                  000720
      IF ((IBOF.NE.1).AND.(KM.LT.25)) WRITE (5,504)KM                        000730
      IF ((IBOF.NE.1).AND.(KM.LT.25)) KM=25                                  00074C
      TK=KM                                                                  000750
103   FORMAT (4A5)                                                           000760
      STIFF=24.27*((TH**3)/TK)**(.25)                                        000770
      IF (TK-50C.)911,912,912                                               000780
912   BK=XT(7,6)                                                             000790
      AK=XT(7,5)                                                             000800
      GO TO 913                                                              000810
C ***    SEARCHES TABLE FOR CORRECT LINE OF DATA. ***                        000820
911   DO 920 MK=1,7                                                          000830
      IF (XT(MK,4)-TK)920,925,926                                           000840
926   JJI=MK-1                                                               00085C
      GO TO 927                                                              000860
925   JJI=MK                                                                 000870
      GO TO 927                                                              000880
920   CONTINUE                                                               000890
C ***    INTERPOLATE FOR CORRECT VALUES     ****                             000900
927   DK=(TK-XT(JJI,4))/(XT(JJI+1,4)-XT(JJI,4))                             000910
      AK=(XT(JJI+1,5)-XT(JJI,5))*DK+XT(JJI,5)                               000920
      BK=(XT(JJI+1,6)-XT(JJI,6))*DK+XT(JJI,6)                               000930
913   AIN=(AK-RA)/BK                                                         000940
      IF (TH.LT.6.) WRITE (5,501)TH                                         000950
      IF (TH.LT.6.) TH=6.                                                   000960
      IF (TH.GT.25.) WRITE (5,502)TH                                        000970
      IF (TH.GT.25.) TH=25.                                                 000980
      IF (TH-25.)950,951,951                                               000990
951   CALF=XT(2C,2)                                                         001000
      DALF=XT(2C,3)                                                         001010
      GO TO 953                                                              001020
C ***    SEARCH FOR CORRECT LINE OF DATA ***                                 001030
950   DO 930 MK=1,20                                                        001040
      IF (XT(MK,1)-TH)930,935,936                                          001050
936   JM=MK-1                                                               C0106C
      GO TO 937                                                              001070
935   JM=MK                                                                  001080
      GO TO 937                                                              001090
930   CONTINUE                                                               001100
C ***    INTERPOLATE AND COMPUTE EVALUATION INDEX  ***                       001110
937   DM=(TH-XT(JM,1))/(XT(JM+1,1)-XT(JM,1))                               001120
      CALF=(XT(JM+1,2)-XT(JM,2))*DM+XT(JM,2)                               00113C
      DALF=(XT(JM+1,3)-XT(JM,3))*DM+XT(JM,3)                               00114C
953   ALF=CALF-DALF*AIN                                                      001150
      IF (IBOF-1)815,819,815                                               001160
815   CALL F1VALU(1,20,YK,F1,KM,0)                                          001170
      GO TO 761                                                             001180
819   CALL F1VALU(21,30,YK,F1,KM,1)                                         001190
761   CONTINUE                                                               001200
C ***    COMPUTES CAPACITY CATEGORY  ***                                     001210
      GO TO (40,50,60),IAREA                                                001220
40    CALL CHART(A,STIFF,ALF,D)                                            001230
      GO TO 190                                                             001240
50    CALL CHART(B,STIFF,ALF,D)                                            001250
      GO TO 190                                                             001260
60    CALL CHART(C,STIFF,ALF,D)                                            001270
190   CONTINUE                                                               001280
414   FORMAT (1X,*CAPACITY*/1X,10F7.0)                                      001290
610   FORMAT (1X,*THANK YOU*)                                               001300
C ***    COMPUTES FULL, MINIMUM,AND EMERGENCY CATEGORIES ***                 001310
150   CALL FMECAL(IAREA,F1(1),F1(4),F1(7),1)                               001320
      CALL FMECAL(IAREA,F1(2),F1(5),F1(8),2)                               001330
      CALL FMECAL(IAREA,F1(3),F1(6),F1(9),3)                               001340
C ***    FOLLOWING STEPS ROUND OFF ANSWERS  ***                             001350
      DO 939 N=1,10                                                         001360
      CALL RNDOFF(F(N))                                                     001370
```

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```
          CALL RNDOFF(R(N))                                              001380
          CALL RNDOFF(E(N))                                              001390
939       CALL RNDOFF(D(N))                                              001400
          WRITE (5,5)FEAT,URE,BASE,INFO,IAREA,KM,RA,TH                   001410
          WRITE (5,414)(D(N),N=1,10)                                     001420
          WRITE (5,510)(F(N),N=1,10)                                     001430
          WRITE (5,520)(R(N),N=1,10)                                     001440
          WRITE (5,530)(E(N),N=1,10)                                     001450
          WRITE (5,540)                                                  001460
5         FORMAT (1X,*RESULTS*/2X,4A5,I3,I5,2F9.3)                       001470
426       FORMAT (1X,11F7.3)                                            001480
501       FORMAT (1X,*THICK(*,F7.3,*).LT.6, T RESET TO 6*)              001490
502       FORMAT (1X,*THICK(*,F7.3,*).GT.25, T RESET TO 25*)            001500
503       FORMAT (1X,*K(*,I4,*) TO BE .GT. 50 FOR FLEX OVERLYS. USED 50*) 001510
504       FORMAT (1X,*K(*,I4,*) TO BE .GT. 25 FOR RIGID PVMNTS. USED 25*) 001520
505       FORMAT (1X,*K(*,I4,*) TO BE .LT. 500. USED 500*)              001530
510       FORMAT (1X,*FULL*/1X,10F7.0)                                   001540
520       FORMAT (1X,7HMINIMUM/1X,10F7.0)                                001550
530       FORMAT (1X,9HEMERGENCY/1X,10F7.0)                              001560
540       FORMAT (1H0///)                                                001570
100       FORMAT (11F6.0)                                                001580
250       CONTINUE                                                       001590
          CALL DISCON (T6)                                               001600
          CALL DISCON (T7)                                               001610
          STOP                                                           001620
          END                                                            001630
          SUBROUTINE RNDOFF(A)                                           001640
          IF (A-25.)10,20,20                                             001650
10        RETURN                                                         001660
20        IF(A-300.)15,30,30                                             001670
15        B=DUB(25,300,5,A)                                              001680
          A=B                                                            001690
          RETURN                                                         001700
30        IF (A-810.)40,40,50                                            001710
40        B=DUB(300,810,10,A)                                            001720
          A=B                                                            001730
          RETURN                                                         001740
50        A=10000000000.                                                 001750
          RETURN                                                         001760
          END                                                            001770
          FUNCTION DUB(I,J,K,A)                                          001780
          DO 10 L=I,J,K                                                  001790
          T=L                                                            001800
          X=ABS(A-T)                                                     001810
          Z=K                                                            001820
          Y=Z/2.                                                         001830
          IF (X-Y)2,2,10                                                 001840
2         DUB=T                                                          001850
          RETURN                                                         001860
10        CONTINUE                                                       001870
          RETURN                                                         001880
          END                                                            001890
          SUBROUTINE CHART(BB,STIFF,ALF,D)                               001900
          DIMENSION BB(44,11),D(10)                                      001910
          DO 10 N=1,44                                                   001920
          IF (BB(N,1)-STIFF)10,20,30                                     001930
30        I=N-1                                                          001940
          GO TO 40                                                       001950
20        I=N                                                            001960
          GO TO 40                                                       001970
10        CONTINUE                                                       001980
40        DO 45 J=2,11                                                   001990
          BC=(BB(I+1,J)-BB(I,J))*(STIFF-BB(I,1))/(BB(I+1,1)-BB(I,1))     002000
          BC=BC+BB(I,J)                                                  002010
45        D(J-1)=ALF*BC/1000.                                           002020
          RETURN                                                         002030
```

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```
        END                                                         002040
        SUBROUTINE FMECAL(IAREA,FA,FB,FC,I)                          002050
        COMMON D(10),R(10),E(10),F(10),ALF,STIFF                     002060
        COMMON /X/G(10)                                              002070
        DIMENSION AM(10)                                             002080
        DO 10 N=1,10                                                 002090
        T=FC                                                         002100
        IF (IAREA-2) 15,20,20                                        002110
15      CONTINUE                                                     002120
        GO TO (20,20,20,20,10,10,10,10,10,18),N                      002130
18      T=FB                                                         002140
        GO TO 10                                                     002150
20      T=FA                                                         002160
10      AM(N)=(1.+T*G(N))*D(N)                                       002170
        IF (I-2)30,40,50                                             002180
30      DO 35 N=1,10                                                 002190
35      F(N)=AM(N)                                                   002200
        RETURN                                                       002210
40      DO 45 N=1,10                                                 002220
45      R(N)=AM(N)                                                   002230
        RETURN                                                       002240
50      DO 55 N=1,10                                                 002250
55      E(N)=AM(N)                                                   002260
        RETURN                                                       002270
        END                                                         002280
        SUBROUTINE F1VALU(I,J,YK,F1,KM,IBOF)                         002290
        DIMENSION YK(30,10),F1(9)                                    002300
        IF (IBOF-1)1,2,1                                             002310
2       IF (KM-50)100,100,3                                          002320
3       IF (KM-500)20,10,10                                          002330
1       IF (KM-25)115,115,4                                          002340
4       IF (KM-500)20,15,15                                          002350
10      L=30                                                         002360
        GO TO 30                                                     002370
15      L=20                                                         002380
        GO TO 30                                                     002390
100     L=21                                                         002400
        GO TO 30                                                     002410
115     L=1                                                          002420
        GO TO 30                                                     002430
20      DO 40 N=I,J                                                  002440
        IF (YK(N,1)-KM)40,67,61                                      002450
61      L=N-1                                                        002460
        GO TO 63                                                     002470
67      L=N                                                          002480
        GO TO 63                                                     002490
40      CONTINUE                                                     002500
63      YD=(KM-YK(L,1))/(YK(L+1,1)-YK(L,1))                          002510
30      DO 72 NP=1,9                                                 002520
        IF (L-20)70,71,73                                            002530
73      IF (L-30)70,71,71                                            002540
71      F1(NP)=YK(L,NP+1)                                            002550
        GO TO 72                                                     002560
70      F1(NP)=(YK(L+1,NP+1)-YK(L,NP+1))*YD+YK(L,NP+1)               002570
72      CONTINUE                                                     002580
        RETURN                                                       002590
        END                                                         002600
        BLOCK DATA                                                   002610
C                                                                    002620
C   THIS SUBROUTINE SETS UP THE VALUES FOR ACHART, BCHART           002630
C     AND CCHART.  IT ALSO ESTABLISHES THE DATA BASE FOR EITHER     002640
C     COMPUTATIONS ON RIGID PAVEMENTS OR FLEXIBLE OVERLAYS ON       002650
C     RIGID PAVEMENTS.  IT ALSO ESTABLISHES THE DATA BASE FOR       002660
C     COMPUTATIONS OF THE EVALUATION INDEX AND THE STIFFNESS FACTOR 002670
C                                                                    002680
        COMMON /TABLE/A(44,11),B(44,11),C(44,11),XT(20,6),YK(30,10)  002690
```

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```
DATA (A( 1,J),J=1,6)/   20., 2090., 1500., 2120., 3430., 4590./    002700
DATA (A( 1,J),J=7,11)/ 3350., 5310., 6360.,18020., 5580./          002710
DATA (A( 2,J),J=1,6)/   22., 2100., 1530., 2130., 3400., 4560./    002720
DATA (A( 2,J),J=7,11)/ 3320., 5180., 6350.,18000., 5500./          002730
DATA (A( 3,J),J=1,6)/   24., 2110., 1560., 2130., 3370., 4530./    002740
DATA (A( 3,J),J=7,11)/ 3280., 5050., 6340.,17970., 5410./          002750
DATA (A( 4,J),J=1,6)/   26., 2120., 1580., 2140., 3340., 4500./    002760
DATA (A( 4,J),J=7,11)/ 3250., 4920., 6330.,17920., 5330./          002770
DATA (A( 5,J),J=1,6)/   28., 2130., 1610., 2140., 3320., 4460./    002780
DATA (A( 5,J),J=7,11)/ 3220., 4790., 6300.,17850., 5250./          002790
DATA (A( 6,J),J=1,6)/   30., 2130., 1630., 2140., 3290., 4420./    002800
DATA (A( 6,J),J=7,11)/ 3190., 4660., 6270.,17760., 5170./          002810
DATA (A( 7,J),J=1,6)/   32., 2140., 1650., 2150., 3260., 4370./    002820
DATA (A( 7,J),J=7,11)/ 3160., 4540., 6230.,17660., 5100./          002830
DATA (A( 8,J),J=1,6)/   34., 2150., 1670., 2150., 3240., 4320./    002840
DATA (A( 8,J),J=7,11)/ 3130., 4430., 6180.,17550., 5020./          002850
DATA (A( 9,J),J=1,6)/   36., 2150., 1680., 2150., 3220., 4280./    002860
DATA (A( 9,J),J=7,11)/ 3100., 4320., 6110.,17410., 4940./          002870
DATA (A(10,J),J=1,6)/   38., 2160., 1700., 2150., 3200., 4230./    002880
DATA (A(10,J),J=7,11)/ 3070., 4230., 6020.,17250., 4870./          002890
DATA (A(11,J),J=1,6)/   40., 2160., 1710., 2160., 3180., 4190./    002900
DATA (A(11,J),J=7,11)/ 3040., 4150., 5910.,17060., 4800./          002910
DATA (A(12,J),J=1,6)/   42., 2160., 1720., 2160., 3160., 4140./    002920
DATA (A(12,J),J=7,11)/ 3020., 4070., 5780.,16840., 4720./          002930
DATA (A(13,J),J=1,6)/   44., 2160., 1730., 2160., 3140., 4090./    002940
DATA (A(13,J),J=7,11)/ 2990., 4000., 5650.,16610., 4660./          002950
DATA (A(14,J),J=1,6)/   46., 2170., 1740., 2160., 3120., 4050./    002960
DATA (A(14,J),J=7,11)/ 2970., 3940., 5520.,16360., 4590./          002970
DATA (A(15,J),J=1,6)/   48., 2170., 1740., 2160., 3100., 4010./    002980
DATA (A(15,J),J=7,11)/ 2950., 3880., 5400.,16090., 4520./          002990
DATA (A(16,J),J=1,6)/   50., 2170., 1750., 2160., 3080., 3970./    003000
DATA (A(16,J),J=7,11)/ 2930., 3820., 5280.,15820., 4450./          003010
DATA (A(17,J),J=1,6)/   52., 2170., 1760., 2160., 3070., 3930./    003020
DATA (A(17,J),J=7,11)/ 2910., 3770., 5160.,15530., 4390./          003030
DATA (A(18,J),J=1,6)/   54., 2170., 1760., 2160., 3050., 3900./    003040
DATA (A(18,J),J=7,11)/ 2890., 3730., 5070.,15240., 4330./          003050
DATA (A(19,J),J=1,6)/   56., 2170., 1770., 2170., 3040., 3870./    003060
DATA (A(19,J),J=7,11)/ 2870., 3690., 4970.,14970., 4280./          003070
DATA (A(20,J),J=1,6)/   58., 2170., 1770., 2170., 3030., 3830./    003080
DATA (A(20,J),J=7,11)/ 2850., 3650., 4880.,14700., 4230./          003090
DATA (A(21,J),J=1,6)/   60., 2180., 1780., 2170., 3020., 3810./    003100
DATA (A(21,J),J=7,11)/ 2830., 3610., 4810.,14450., 4180./          003110
DATA (A(22,J),J=1,6)/   62., 2180., 1780., 2170., 3010., 3780./    003120
DATA (A(22,J),J=7,11)/ 2810., 3580., 4740.,14200., 4130./          003130
DATA (A(23,J),J=1,6)/   64., 2180., 1790., 2170., 3000., 3750./    003140
DATA (A(23,J),J=7,11)/ 2800., 3550., 4670.,13970., 4090./          003150
DATA (A(24,J),J=1,6)/   66., 2180., 1790., 2170., 2990., 3720./    003160
DATA (A(24,J),J=7,11)/ 2780., 3520., 4600.,13760., 4050./          003170
DATA (A(25,J),J=1,6)/   68., 2180., 1800., 2170., 2980., 3700./    003180
DATA (A(25,J),J=7,11)/ 2770., 3500., 4540.,13550., 4010./          003190
DATA (A(26,J),J=1,6)/   70., 2180., 1800., 2170., 2970., 3680./    003200
DATA (A(26,J),J=7,11)/ 2750., 3470., 4490.,13350., 3970./          003210
DATA (A(27,J),J=1,6)/   72., 2190., 1810., 2170., 2960., 3650./    003220
DATA (A(27,J),J=7,11)/ 2740., 3450., 4430.,13160., 3940./          003230
DATA (A(28,J),J=1,6)/   74., 2180., 1810., 2170., 2950., 3630./    003240
DATA (A(28,J),J=7,11)/ 2720., 3430., 4370.,12970., 3900./          003250
DATA (A(29,J),J=1,6)/   76., 2180., 1820., 2170., 2940., 3610./    003260
DATA (A(29,J),J=7,11)/ 2710., 3410., 4320.,12780., 3870./          003270
DATA (A(30,J),J=1,6)/   78., 2180., 1820., 2170., 2930., 3590./    003280
DATA (A(30,J),J=7,11)/ 2700., 3380., 4280.,12600., 3840./          003290
DATA (A(31,J),J=1,6)/   80., 2180., 1830., 2170., 2920., 3570./    003300
DATA (A(31,J),J=7,11)/ 2690., 3360., 4240.,12420., 3810./          003310
DATA (A(32,J),J=1,6)/   84., 2190., 1830., 2170., 2910., 3530./    003320
DATA (A(32,J),J=7,11)/ 2670., 3320., 4150.,12140., 3760./          003330
DATA (A(33,J),J=1,6)/   88., 2190., 1840., 2180., 2900., 3490./    003340
DATA (A(33,J),J=7,11)/ 2650., 3290., 4070.,11870., 3710./          003350
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DATA (A(34,J),J=1,6)/    92., 2190., 1840., 2180., 2890., 3450./    003360
DATA (A(34,J),J=7,11)/ 2630., 3250., 3990.,11620., 3670./           003370
DATA (A(35,J),J=1,6)/    96., 2190., 1850., 2180., 2980., 3410./    003380
DATA (A(35,J),J=7,11)/ 2610., 3220., 3920.,11390., 3630./           003390
DATA (A(36,J),J=1,6)/   100., 2190., 1850., 2180., 2870., 3380./    003400
DATA (A(36,J),J=7,11)/ 2590., 3190., 3850.,11190., 3590./           003410
DATA (A(37,J),J=1,6)/   105., 2190., 1850., 2180., 2860., 3330./    003420
DATA (A(37,J),J=7,11)/ 2570., 3160., 3780.,10990., 3550./           003430
DATA (A(38,J),J=1,6)/   110., 2190., 1860., 2180., 2850., 3280./    003440
DATA (A(38,J),J=7,11)/ 2560., 3130., 3700.,10800., 3510./           003450
DATA (A(39,J),J=1,6)/   115., 2190., 1860., 2180., 2840., 3240./    003460
DATA (A(39,J),J=7,11)/ 2550., 3110., 3620.,10620., 3480./           003470
DATA (A(40,J),J=1,6)/   120., 2200., 1870., 2180., 2830., 3200./    003480
DATA (A(40,J),J=7,11)/ 2540., 3090., 3560.,10450., 3450./           003490
DATA (A(41,J),J=1,6)/   125., 2200., 1870., 2180., 2820., 3160./    003500
DATA (A(41,J),J=7,11)/ 2540., 3070., 3500.,10300., 3430./           003510
DATA (A(42,J),J=1,6)/   130., 2200., 1880., 2180., 2820., 3120./    003520
DATA (A(42,J),J=7,11)/ 2530., 3050., 3450.,10160., 3410./           003530
DATA (A(43,J),J=1,6)/   135., 2200., 1890., 2180., 2810., 3030./    003540
DATA (A(43,J),J=7,11)/ 2530., 3040., 3400.,10040., 3390./           003550
DATA (A(44,J),J=1,6)/   140., 2200., 1890., 2180., 2810., 3050./    003560
DATA (A(44,J),J=7,11)/ 2530., 3030., 3350., 9950., 3380./           003570
DATA (B( 1,J),J=1,5)/    20., 2090., 1500., 2120., 3430./           003580
DATA (B( 1,K),K=6,11)/ 5420., 3990., 6180., 7440.,20810., 5940./    003590
DATA (B( 2,J),J=1,5)/    22., 2100., 1530., 2130., 3400./           003600
DATA (B( 2,K),K=6,11)/ 5390., 3950., 6020., 7430.,20790., 5850./    003610
DATA (B( 3,J),J=1,5)/    24., 2110., 1560., 2130., 3370./           003620
DATA (B( 3,K),K=6,11)/ 5360., 3910., 5870., 7420.,20750., 5770./    003630
DATA (B( 4,J),J=1,5)/    26., 2120., 1580., 2140., 3340./           003640
DATA (B( 4,K),K=6,11)/ 5320., 3870., 5720., 7410.,20690., 5680./    003650
DATA (B( 5,J),J=1,5)/    28., 2130., 1610., 2140., 3320./           003660
DATA (B( 5,K),K=6,11)/ 5270., 3830., 5570., 7380.,20610., 5600./    003670
DATA (B( 6,J),J=1,5)/    30., 2130., 1630., 2140., 3290./           003680
DATA (B( 6,K),K=6,11)/ 5220., 3800., 5420., 7340.,20510., 5510./    003690
DATA (B( 7,J),J=1,5)/    32., 2140., 1650., 2150., 3260./           003700
DATA (B( 7,K),K=6,11)/ 5170., 3770., 5280., 7290.,20400., 5430./    003710
DATA (B( 8,J),J=1,5)/    34., 2150., 1670., 2150., 3240./           003720
DATA (B( 8,K),K=6,11)/ 5110., 3730., 5150., 7230.,20270., 5340./    003730
DATA (B( 9,J),J=1,5)/    36., 2150., 1680., 2150., 3220./           003740
DATA (B( 9,K),K=6,11)/ 5060., 3690., 5040., 7190.,20110., 5260./    003750
DATA (B(10,J),J=1,5)/    38., 2160., 1700., 2150., 3200./           003760
DATA (B(10,K),K=6,11)/ 5000., 3660., 4930., 7090.,19920., 5190./    003770
DATA (B(11,J),J=1,5)/    40., 2160., 1710., 2160., 3180./           003780
DATA (B(11,K),K=6,11)/ 4950., 3630., 4830., 6920.,19700., 5110./    003790
DATA (B(12,J),J=1,5)/    42., 2160., 1720., 2160., 3160./           003800
DATA (B(12,K),K=6,11)/ 4890., 3600., 4730., 6760.,19450., 5030./    003810
DATA (B(13,J),J=1,5)/    44., 2160., 1730., 2160., 3140./           003820
DATA (B(13,K),K=6,11)/ 4840., 3570., 4640., 6610.,19180., 4960./    003830
DATA (B(14,J),J=1,5)/    46., 2170., 1740., 2160., 3120./           003840
DATA (B(14,K),K=6,11)/ 4790., 3540., 4570., 6460.,18890., 4880./    003850
DATA (B(15,J),J=1,5)/    48., 2170., 1740., 2160., 3100./           003860
DATA (B(15,K),K=6,11)/ 4740., 3510., 4510., 6320.,18550., 4810./    003870
DATA (B(16,J),J=1,5)/    50., 2170., 1750., 2160., 3080./           003880
DATA (B(16,K),K=6,11)/ 4700., 3490., 4440., 6180.,18260., 4740./    003890
DATA (B(17,J),J=1,5)/    52., 2170., 1760., 2160., 3070./           003900
DATA (B(17,K),K=6,11)/ 4650., 3460., 4380., 6050.,17930., 4680./    003910
DATA (B(18,J),J=1,5)/    54., 2170., 1760., 2160., 3050./           003920
DATA (B(18,K),K=6,11)/ 4610., 3440., 4330., 5930.,17600., 4620./    003930
DATA (B(19,J),J=1,5)/    56., 2170., 1770., 2170., 3040./           003940
DATA (B(19,K),K=6,11)/ 4570., 3420., 4280., 5820.,17280., 4560./    003950
DATA (B(20,J),J=1,5)/    58., 2170., 1770., 2170., 3030./           003960
DATA (B(20,K),K=6,11)/ 4530., 3400., 4240., 5720.,16980., 4500./    003970
DATA (B(21,J),J=1,5)/    60., 2180., 1780., 2170., 3020./           003980
DATA (B(21,K),K=6,11)/ 4500., 3370., 4200., 5630.,16690., 4450./    003990
DATA (B(22,J),J=1,5)/    62., 2180., 1780., 2170., 3010./           004000
DATA (B(22,K),K=6,11)/ 4460., 3350., 4160., 5540.,16410., 4400./    004010
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DATA (B(23,J),J=1,5)/    64., 2180., 1790., 2170., 3000./         004020
DATA (B(23,K),K=6,11)/ 4430., 3330., 4130., 5460.,16140., 4350./  004030
DATA (B(24,J),J=1,5)/    66., 2180., 1790., 2170., 2990./         004040
DATA (B(24,K),K=6,11)/ 4400., 3310., 4100., 5390.,15890., 4310./  004050
DATA (B(25,J),J=1,5)/    68., 2180., 1800., 2170., 2980./         004060
DATA (B(25,K),K=6,11)/ 4370., 3300., 4070., 5320.,15650., 4270./  004070
DATA (B(26,J),J=1,5)/    70., 2180., 1800., 2170., 2970./         004080
DATA (B(26,K),K=6,11)/ 4350., 3280., 4040., 5250.,15420., 4230./  004090
DATA (B(27,J),J=1,5)/    72., 2180., 1810., 2170., 2960./         004100
DATA (B(27,K),K=6,11)/ 4320., 3260., 4010., 5180.,15200., 4190./  004110
DATA (B(28,J),J=1,5)/    74., 2180., 1810., 2170., 2950./         004120
DATA (B(28,K),K=6,11)/ 4290., 3240., 3980., 5120.,14980., 4150./  004130
DATA (B(29,J),J=1,5)/    76., 2180., 1820., 2170., 2940./         004140
DATA (B(29,K),K=6,11)/ 4270., 3230., 3960., 5060.,14760., 4120./  004150
DATA (B(30,J),J=1,5)/    78., 2180., 1820., 2170., 2930./         004160
DATA (B(30,K),K=6,11)/ 4240., 3210., 3930., 5010.,14550., 4090./  004170
DATA (B(31,J),J=1,5)/    80., 2180., 1830., 2170., 2920./         004180
DATA (B(31,K),K=6,11)/ 4220., 3200., 3910., 4970.,14340., 4060./  004190
DATA (B(32,J),J=1,5)/    84., 2190., 1830., 2170., 2910./         004200
DATA (B(32,K),K=6,11)/ 4170., 3170., 3860., 4870.,14020., 4010./  004210
DATA (B(33,J),J=1,5)/    88., 2190., 1840., 2180., 2900./         004220
DATA (B(33,K),K=6,11)/ 4120., 3140., 3820., 4770.,13710., 3960./  004230
DATA (B(34,J),J=1,5)/    92., 2190., 1840., 2180., 2890./         004240
DATA (B(34,K),K=6,11)/ 4080., 3120., 3780., 4680.,13420., 3910./  004250
DATA (B(35,J),J=1,5)/    96., 2190., 1850., 2180., 2880./         004260
DATA (B(35,K),K=6,11)/ 4030., 3100., 3740., 4590.,13150., 3870./  004270
DATA (B(36,J),J=1,5)/   100., 2190., 1850., 2180., 2870./         004280
DATA (B(36,K),K=6,11)/ 3990., 3080., 3710., 4510.,12920., 3830./  004290
DATA (B(37,J),J=1,5)/   105., 2190., 1850., 2180., 2860./         004300
DATA (B(37,K),K=6,11)/ 3930., 3060., 3680., 4420.,12690., 3790./  004310
DATA (B(38,J),J=1,5)/   110., 2190., 1860., 2180., 2850./         004320
DATA (B(38,K),K=6,11)/ 3880., 3050., 3640., 4330.,12470., 3740./  004330
DATA (B(39,J),J=1,5)/   115., 2190., 1860., 2180., 2840./         004340
DATA (B(39,K),K=6,11)/ 3830., 3040., 3610., 4250.,12260., 3700./  004350
DATA (B(40,J),J=1,5)/   120., 2200., 1870., 2180., 2830./         004360
DATA (B(40,K),K=6,11)/ 3780., 3030., 3590., 4170.,12070., 3670./  004370
DATA (B(41,J),J=1,5)/   125., 2200., 1870., 2180., 2820./         004380
DATA (B(41,K),K=6,11)/ 3740., 3030., 3570., 4100.,11890., 3650./  004390
DATA (B(42,J),J=1,5)/   130., 2200., 1880., 2180., 2820./         004400
DATA (B(42,K),K=6,11)/ 3690., 3020., 3550., 4040.,11730., 3630./  004410
DATA (B(43,J),J=1,5)/   135., 2200., 1890., 2180., 2810./         004420
DATA (B(43,K),K=6,11)/ 3650., 3020., 3530., 3980.,11600., 3620./  004430
DATA (B(44,J),J=1,5)/   140., 2200., 1890., 2180., 2810./         004440
DATA (B(44,K),K=6,11)/ 3610., 3010., 3520., 3920.,11490., 3610./  004450
DATA (C( 1,K),K=1,6)/    20., 2790., 2000., 2830., 4570., 7230./  004460
DATA (C( 1,K),K=7,11)/ 5320., 8240., 9920.,27740., 7920./         004470
DATA (C( 2,K),K=1,6)/    22., 2800., 2040., 2840., 4530., 7190./  004480
DATA (C( 2,K),K=7,11)/ 5270., 8030., 9910.,27710., 7800./         004490
DATA (C( 3,K),K=1,6)/    24., 2810., 2080., 2840., 4490., 7150./  004500
DATA (C( 3,K),K=7,11)/ 5210., 7830., 9890.,27660., 7690./         004510
DATA (C( 4,K),K=1,6)/    26., 2830., 2110., 2850., 4450., 7090./  004520
DATA (C( 4,K),K=7,11)/ 5160., 7630., 9880.,27580., 7570./         004530
DATA (C( 5,K),K=1,6)/    28., 2840., 2150., 2860., 4430., 7030./  004540
DATA (C( 5,K),K=7,11)/ 5110., 7430., 9830.,27470., 7470./         004550
DATA (C( 6,K),K=1,6)/    30., 2840., 2170., 2860., 4390., 6960./  004560
DATA (C( 6,K),K=7,11)/ 5070., 7230., 9790.,27340., 7350./         004570
DATA (C( 7,K),K=1,6)/    32., 2850., 2200., 2860., 4350., 6890./  004580
DATA (C( 7,K),K=7,11)/ 5030., 7040., 9720.,27190., 7240./         004590
DATA (C( 8,K),K=1,6)/    34., 2870., 2230., 2870., 4320., 6810./  004600
DATA (C( 8,K),K=7,11)/ 4970., 6870., 9640.,27020., 7120./         004610
DATA (C( 9,K),K=1,6)/    36., 2870., 2240., 2870., 4290., 6750./  004620
DATA (C( 9,K),K=7,11)/ 4920., 6720., 9540.,26810., 7010./         004630
DATA (C(10,K),K=1,6)/    38., 2880., 2270., 2870., 4270., 6670./  004640
DATA (C(10,K),K=7,11)/ 4680., 6570., 9400.,26550., 6920./         004650
DATA (C(11,K),K=1,6)/    40., 2830., 2280., 2870., 4240., 6600./  004660
DATA (C(11,K),K=7,11)/ 4840., 6440., 9230.,26260., 6810./         004670
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DATA (C(12,K),K=1,6)/    42., 2880., 2290., 2880., 4210., 6520./    004680
DATA (C(12,K),K=7,11)/ 4800., 6310., 9020.,25930., 6710./           004690
DATA (C(13,K),K=1,6)/    44., 2880., 2310., 2880., 4190., 6450./    004700
DATA (C(13,K),K=7,11)/ 4760., 6190., 8810.,25570., 6610./           004710
DATA (C(14,K),K=1,6)/    46., 2890., 2320., 2880., 4160., 6390./    004720
DATA (C(14,K),K=7,11)/ 4720., 6090., 8620.,25180., 6510./           004730
DATA (C(15,K),K=1,6)/    48., 2890., 2320., 2880., 4130., 6320./    004740
DATA (C(15,K),K=7,11)/ 4680., 6010., 8430.,24770., 6410./           004750
DATA (C(16,K),K=1,6)/    50., 2890., 2330., 2880., 4110., 6270./    004760
DATA (C(16,K),K=7,11)/ 4650., 5920., 8240.,24340., 6320./           004770
DATA (C(17,K),K=1,6)/    52., 2890., 2350., 2880., 4090., 6200./    004780
DATA (C(17,K),K=7,11)/ 4610., 5840., 8060.,23900., 6240./           004790
DATA (C(18,K),K=1,6)/    54., 2890., 2350., 2890., 4070., 6150./    004800
DATA (C(18,K),K=7,11)/ 4590., 5770., 7900.,23460., 6160./           004810
DATA (C(19,K),K=1,6)/    56., 2890., 2360., 2890., 4050., 6090./    004820
DATA (C(19,K),K=7,11)/ 4560., 5710., 7760.,23030., 6080./           004830
DATA (C(20,K),K=1,6)/    58., 2890., 2360., 2890., 4040., 6040./    004840
DATA (C(20,K),K=7,11)/ 4530., 5650., 7630.,22630., 6000./           004850
DATA (C(21,K),K=1,6)/    60., 2910., 2370., 2890., 4030., 6000./    004860
DATA (C(21,K),K=7,11)/ 4490., 5600., 7510.,22250., 5930./           004870
DATA (C(22,K),K=1,6)/    62., 2910., 2370., 2890., 4010., 5950./    004880
DATA (C(22,K),K=7,11)/ 4470., 5550., 7390.,21870., 5870./           004890
DATA (C(23,K),K=1,6)/    64., 2910., 2390., 2890., 4000., 5910./    004900
DATA (C(23,K),K=7,11)/ 4440., 5510., 7280.,21510., 5800./           004910
DATA (C(24,K),K=1,6)/    66., 2910., 2390., 2890., 3990., 5870./    004920
DATA (C(24,K),K=7,11)/ 4410., 5470., 7180.,21180., 5750./           004930
DATA (C(25,K),K=1,6)/    68., 2910., 2400., 2890., 3970., 5830./    004940
DATA (C(25,K),K=7,11)/ 4400., 5430., 7090.,20860., 5690./           004950
DATA (C(26,K),K=1,6)/    70., 2910., 2400., 2890., 3960., 5800./    004960
DATA (C(26,K),K=7,11)/ 4370., 5390., 7000.,20560., 5640./           004970
DATA (C(27,K),K=1,6)/    72., 2910., 2410., 2900., 3950., 5760./    004980
DATA (C(27,K),K=7,11)/ 4350., 5350., 6910.,20260., 5590./           004990
DATA (C(28,K),K=1,6)/    74., 2910., 2410., 2900., 3930., 5720./    005000
DATA (C(28,K),K=7,11)/ 4320., 5310., 6830.,19970., 5530./           005010
DATA (C(29,K),K=1,6)/    76., 2910., 2430., 2900., 3920., 5690./    005020
DATA (C(29,K),K=7,11)/ 4310., 5280., 6750.,19680., 5490./           005030
DATA (C(30,K),K=1,6)/    78., 2910., 2430., 2900., 3910., 5650./    005040
DATA (C(30,K),K=7,11)/ 4280., 5240., 6680.,19390., 5450./           005050
DATA (C(31,K),K=1,6)/    80., 2910., 2440., 2900., 3890., 5630./    005060
DATA (C(31,K),K=7,11)/ 4270., 5210., 6620.,19120., 5410./           005070
DATA (C(32,K),K=1,6)/    84., 2920., 2440., 2900., 3880., 5560./    005080
DATA (C(32,K),K=7,11)/ 4230., 5150., 6470.,18690., 5350./           005090
DATA (C(33,K),K=1,6)/    88., 2920., 2450., 2900., 3870., 5490./    005100
DATA (C(33,K),K=7,11)/ 4190., 5090., 6350.,18280., 5280./           005110
DATA (C(34,K),K=1,6)/    92., 2920., 2450., 2900., 3850., 5440./    005120
DATA (C(34,K),K=7,11)/ 4160., 5040., 6230.,17890., 5210./           005130
DATA (C(35,K),K=1,6)/    96., 2920., 2470., 2900., 3840., 5370./    005140
DATA (C(35,K),K=7,11)/ 4130., 4990., 6130.,17530., 5160./           005150
DATA (C(36,K),K=1,6)/   100., 2920., 2470., 2900., 3830., 5320./    005160
DATA (C(36,K),K=7,11)/ 4110., 4950., 6010.,17220., 5110./           005170
DATA (C(37,K),K=1,6)/   105., 2920., 2470., 2900., 3810., 5240./    005180
DATA (C(37,K),K=7,11)/ 4080., 4910., 5830.,16910., 5050./           005190
DATA (C(38,K),K=1,6)/   110., 2920., 2480., 2910., 3800., 5170./    005200
DATA (C(38,K),K=7,11)/ 4070., 4850., 5730.,16620., 4990./           005210
DATA (C(39,K),K=1,6)/   115., 2930., 2480., 2910., 3790., 5110./    005220
DATA (C(39,K),K=7,11)/ 4050., 4810., 5660.,16350., 4930./           005230
DATA (C(40,K),K=1,6)/   120., 2930., 2490., 2910., 3770., 5040./    005240
DATA (C(40,K),K=7,11)/ 4040., 4790., 5550.,16090., 4890./           005250
DATA (C(41,K),K=1,6)/   125., 2930., 2490., 2910., 3760., 4990./    005260
DATA (C(41,K),K=7,11)/ 4040., 4760., 5460.,15850., 4870./           005270
DATA (C(42,K),K=1,6)/   130., 2930., 2510., 2910., 3760., 4920./    005280
DATA (C(42,K),K=7,11)/ 4030., 4730., 5380.,15640., 4840./           005290
DATA (C(43,K),K=1,6)/   135., 2930., 2520., 2910., 3750., 4870./    005300
DATA (C(43,K),K=7,11)/ 4030., 4710., 5300.,15460., 4830./           005310
DATA (C(44,K),K=1,6)/   140., 2930., 2520., 2910., 3750., 4810./    005320
DATA (C(44,K),K=7,11)/ 4010., 4690., 5230.,15310., 4810./           005330
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DATA (YK( 1,K),K=1,5)/25.000,  .070,  .150,  .225,  .035/        005340
DATA (YK( 1,K),K=6,10)/  .095,  .170,  .070,  .130,  .210/        005350
DATA (YK( 2,K),K=1,5)/50.000,  .100,  .215,  .360,  .050/        005360
DATA (YK( 2,K),K=6,10)/  .135,  .245,  .090,  .175,  .295/        005370
DATA (YK( 3,K),K=1,5)/75.000,  .130,  .275,  .460,  .065/        005380
DATA (YK( 3,K),K=6,10)/  .165,  .310,  .105,  .205,  .360/        005390
DATA (YK( 4,K),K=1,5)/100.00,  .155,  .330,  .530,  .080/        005400
DATA (YK( 4,K),K=6,10)/  .190,  .350,  .120,  .230,  .410/        005410
DATA (YK( 5,K),K=1,5)/125.00,  .175,  .365,  .595,  .090/        005420
DATA (YK( 5,K),K=6,10)/  .210,  .385,  .130,  .255,  .440/        005430
DATA (YK( 6,K),K=1,5)/150.00,  .190,  .390,  .640,  .100/        005440
DATA (YK( 6,K),K=6,10)/  .225,  .410,  .137,  .276,  .470/        005450
DATA (YK( 7,K),K=1,5)/175.00,  .210,  .410,  .680,  .110/        005460
DATA (YK( 7,K),K=6,10)/  .240,  .430,  .145,  .290,  .490/        005470
DATA (YK( 8,K),K=1,5)/200.00,  .220,  .430,  .710,  .115/        005480
DATA (YK( 8,K),K=6,10)/  .250,  .460,  .150,  .300,  .510/        005490
DATA (YK( 9,K),K=1,5)/225.00,  .235,  .450,  .740,  .125/        005500
DATA (YK( 9,K),K=6,10)/  .260,  .475,  .160,  .310,  .530/        005510
DATA (YK(10,K),K=1,5)/250.00,  .245,  .465,  .775,  .130/        005520
DATA (YK(10,K),K=6,10)/  .270,  .500,  .165,  .320,  .550/        005530
DATA (YK(11,K),K=1,5)/275.00,  .255,  .485,  .810,  .135/        005540
DATA (YK(11,K),K=6,10)/  .275,  .520,  .170,  .327,  .570/        005550
DATA (YK(12,K),K=1,5)/300.00,  .265,  .505,  .855,  .140/        005560
DATA (YK(12,K),K=6,10)/  .280,  .540,  .175,  .335,  .590/        005570
DATA (YK(13,K),K=1,5)/325.00,  .275,  .530,  .900,  .148/        005580
DATA (YK(13,K),K=6,10)/  .290,  .560,  .180,  .340,  .620/        005590
DATA (YK(14,K),K=1,5)/350.00,  .285,  .550,  .960,  .150/        005600
DATA (YK(14,K),K=6,10)/  .300,  .590,  .185,  .350,  .640/        005610
DATA (YK(15,K),K=1,5)/375.00,  .295,  .580, 1.030,  .155/        005620
DATA (YK(15,K),K=6,10)/  .315,  .620,  .190,  .365,  .670/        005630
DATA (YK(16,K),K=1,5)/400.00,  .310,  .610, 1.140,  .160/        005640
DATA (YK(16,K),K=6,10)/  .330,  .650,  .195,  .380,  .705/        005650
DATA (YK(17,K),K=1,5)/425.00,  .325,  .640, 1.200,  .165/        005660
DATA (YK(17,K),K=6,10)/  .345,  .680,  .200,  .396,  .740/        005670
DATA (YK(18,K),K=1,5)/450.00,  .340,  .675, 1.200,  .168/        005680
DATA (YK(18,K),K=6,10)/  .360,  .720,  .205,  .410,  .780/        005690
DATA (YK(19,K),K=1,5)/475.00,  .355,  .720, 1.200,  .170/        005700
DATA (YK(19,K),K=6,10)/  .380,  .760,  .210,  .435,  .820/        005710
DATA (YK(20,K),K=1,5)/500.00,  .370,  .770, 1.200,  .175/        005720
DATA (YK(20,K),K=6,10)/  .405,  .810,  .215,  .460,  .870/        005730
DATA (YK(21,K),K=1,5)/50.000,  .105,  .255,  .500,  .032/        005740
DATA (YK(21,K),K=6,10)/  .150,  .320,  .079,  .200,  .390/        005750
DATA (YK(22,K),K=1,5)/100.00,  .170,  .430,  .960,  .045/        005760
DATA (YK(22,K),K=6,10)/  .225,  .520,  .100,  .290,  .570/        005770
DATA (YK(23,K),K=1,5)/150.00,  .212,  .560, 1.290,  .053/        005780
DATA (YK(23,K),K=6,10)/  .270,  .650,  .120,  .350,  .720/        005790
DATA (YK(24,K),K=1,5)/200.00,  .233,  .660, 1.570,  .060/        005800
DATA (YK(24,K),K=6,10)/  .300,  .740,  .130,  .380,  .820/        005810
DATA (YK(25,K),K=1,5)/250.00,  .250,  .770, 2.100,  .064/        005820
DATA (YK(25,K),K=6,10)/  .330,  .830,  .140,  .420,  .950/        005830
DATA (YK(26,K),K=1,5)/300.00,  .280,  .920, 3.000,  .069/        005840
DATA (YK(26,K),K=6,10)/  .370,  .980,  .160,  .480, 1.200/        005850
DATA (YK(27,K),K=1,5)/350.00,  .320, 1.150, 3.000,  .077/        005860
DATA (YK(27,K),K=6,10)/  .450, 1.200,  .175,  .560, 1.450/        005870
DATA (YK(28,K),K=1,5)/400.00,  .385, 1.580, 3.000,  .090/        005880
DATA (YK(28,K),K=6,10)/  .550, 1.650,  .190,  .670, 2.150/        005890
DATA (YK(29,K),K=1,5)/450.00,  .500, 2.450, 3.000,  .110/        005900
DATA (YK(29,K),K=6,10)/  .700, 3.000,  .230,  .870, 3.000/        005910
DATA (YK(30,K),K=1,5)/500.00,  .760, 3.000, 3.000,  .130/        005920
DATA (YK(30,K),K=6,10)/  .960, 3.000,  .280, 1.300, 3.000/        005930
DATA (XT( 1,K),K=1,6)/   6.,   14.,  .04 ,   25.,  820.,  2.15/  005940
DATA (XT( 2,K),K=1,6)/   7.,   18.,  .05,    50.,  755.,  2.1 /  005950
DATA (XT( 3,K),K=1,6)/   8.,   22.,  .06,   100.,  695.,  1.9 /  005960
DATA (XT( 4,K),K=1,6)/   9.,   27.,  .08,   200.,  633.,  1.75/  005970
DATA (XT( 5,K),K=1,6)/  10.,   31.,  .09,   300.,  555.,  1.5 /  005980
DATA (XT( 6,K),K=1,6)/  11.,   36.,  .1,    400.,  480.,  1.35/  005990
```

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```
DATA (XT( 7,K),K=1,6)/   12.,   41.,    .11,  500.,  395.,  1.23/  006000
DATA (XT( 8,K),K=1,6)/   13.,   47.,    .13,    0.,    0.,   0./   006010
DATA (XT( 9,K),K=1,6)/   14.,   54.,    .15,    0.,    0.,   0./   006020
DATA (XT(10,K),K=1,6)/   15.,   59.,    .17,    0.,    0.,   0./   006030
DATA (XT(11,K),K=1,6)/   16.,   66.,    .19,    0.,    0.,   0./   006040
DATA (XT(12,K),K=1,6)/   17.,   73.,    .21,    0.,    0.,   0./   006050
DATA (XT(13,K),K=1,6)/   18.,   80.,   .225,    0.,    0.,   0./   006060
DATA (XT(14,K),K=1,6)/   19.,   87.,    .25 ,   0.,    0.,   0./   006070
DATA (XT(15,K),K=1,6)/   20.,   94.,    .26,    0.,    0.,   0./   006080
DATA (XT(16,K),K=1,6)/   21.,  103.,    .29,    0.,    0.,   0./   006090
DATA (XT(17,K),K=1,6)/   22.,  111.,   .305,    0.,    0.,   0./   006100
DATA (XT(18,K),K=1,6)/   23.,  121.,    .34,    0.,    0.,   0./   006110
DATA (XT(19,K),K=1,6)/   24.,  129.,    .35,    0.,    0.,   0./   006120
DATA (XT(20,K),K=1,6)/   25.,  138.,    .33,    0.,    0.,   0./   006130
END                                                               006140
```

IOBC000 //// END OF LIST ON LP 16 AT 10.40.12.ON 20/11/74 ////

$$$
$$$

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VI. PROGRAM USAGE

A. **Data Input**.

Note: All numerical fields must be right justified.

CARD NO.   DESCRIPTION

  1   Number of features (I3 format) 001 thru 999.

  2   Are flexible overlay features being computed (Yes, No)
             (A3 format).

Cards 3 & 4 (and 5 where requried) form a repeating set. One set
required for each feature evaluated.

  3   "Traffic area type, K, R, and T" Card

             a. Entered via remote terminal when program displays a
             message requesting traffic area type K, R, and T.

             b. Card layout.

                 Col 1 - 2 TRAFFIC AREA TYPE - Use following Code:

                     Type "A" - enter "01"
                     Type "B" - enter "02"
                     Type "C" - enter "03"

                 Col 3 - 6 MODULUS OF SUBGRADE REACTION (K) - enter
                     values from "0025" to "0500" for rigid pavements
                     "0050" to "0500" for flexible overlays.

                 Col 7-13 FLEXURAL STRENGTH (R) - Must be a value
                     of six digits and include a decimal point.
                     Leading zeroes and zeroes trailing to the
                     right of the decimal point may be omitted.

                 Col 14-20 Thickness (or equivalent thickness)(T)(inches)
                     Same format as flexural strength. Enter
                     equivalent thickness only when flexible
                     overlay is being evaluated.
                                                    $6 \leqslant T \leqslant 25$

  4   "FEATURE AND BASE INFORMATION" CARD

             a. Entered via remote terminal when program displays a
             message requesting base and feature information.

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        b. CARD LAYOUT

        Col 1-20   FEAT, AND BASE INFO - Enter identifying
                  information for heading purposes.

5   ·   (Used only if answer to #2 was yes) Is this a
               flexible overlay (yes, no) (A3 Format).

B. Program Run Instructions.

    1. Initially the program, during execution, will ask the following
questions or prompt the user for the information.

        (a) Input # of features - use 3 spaces - 00X thru XXX (this
sets up the looping for each feature 1 thru 999 sets of calculations
can be performed).

        (b) Are you computing values for any flexible overlay features?
(Yes, No) (if Yes, the program will prompt the user after each feature
for additional information).

    2. At this point, the program enters the calculation loop. The
program prompts the user for the following for each feature.

        (a) Input Data - Feat Type, K, R, and T use 2 Sp (01, 02, 03)
FOR FEAT TYPE (A, B, C), 4 SP FOR K (0025 thru 0500) and 7 SPACES EACH
WITH DECIMAL FOR R AND T. (User inputs data IAW Section A, Card 3).

            (1) Input feat and base info - 20 SPAC or less (user in-
puts information data to be printed in the answer - not used for cal-
culations).

            (2) If the answer to question 1 was "yes", then the pro-
gram asks this question:

               Is this a flexible overlay? (Yes, No)

            When statement #2a shows up again, the calculations
for the previous feature have been performed and written on the file
Tape5 with carriage control characters.

            (3) After successful completion of the total calculations,
the program will issue the word: STOP; and execution will cease. The
answers, with the input data, will be on Tape5.

(4) The program is written for interactive execution but can be used in a batch mode as well. The following commands are needed for the interactive mode on the CDC 6600 Intercom System (Scope 3.3).

    <u>a</u>. ATTACH, LFN, RIGID (or FETCH, P <u>XXXX</u>)

    <u>b</u>. LFN

    <u>c</u>. Answer the question/instructions

    <u>d</u>. PAGE, TAPE5, for answers (input data checking) - Print from page routine or,

    <u>e</u>. DISPOSE, TAPE5, PR=CU1, for line printer output.

The following cards are needed for BATCH operation. On the CDC 6600 Scope 3.3 operating system.

A. JOB, TL 20 sec, CM 25000.

B. SAD, Tape5, UP1.

C. ATTACH, LFN, RIGID (or FETCH, P <u>XXXX</u>)

D. LFN

E. 7-8-9

F. Data Deck

G. 6-7-8-9

C. <u>Description of Output</u>.

The general format of the output for each feature is as follows:

BASE & FEAT. ID	INPUT DATA FEAT TYPE K, R, T
"CAPACITY" AGL FOR TEN GEAR CONFIGURATIONS	
"FULL" AGL FOR TEN GEAR CONFIGURATIONS	
"MINIMUM" AGL FOR TEN GEAR CONFIGURATIONS	
"EMERGENCY" AGL TEN GEAR CONFIGURATIONS	

See following pages for sample output.

RESULTS
R30   1 290 730.000   20.000
CAPACITY
  265.   215.   265.   370.   470.   350.   450.   610.*00000.   530.
FULL
  390.   330.   400.   530.   540.   450.   560.   750.*00000.   630.
MINIMUM
  500.   420.   520.   680.   680.   530.   660.*00000.*00000.   740.
EMERGENCY
  560.   560.   690.*00000.*00000.   570.*00000.*00000.*00000.*00000.

RESULTS
R43   2 290 770.000   19.000
CAPACITY
  260.   215.   260.   370.   560.   420.   530.   720.*00000.   560.
FULL
  390.   320.   390.   530.   750.   540.   710.*00000.*00000.   770.
MINIMUM
  430.   420.   510.   670.*00000.   740.*00000.*00000.*00000.*00000.
EMERGENCY
  550.   560.   680.*00000.*00000.*00000.*00000.*00000.*00000.*00000.

RESULTS
R93   3 270 810.000   15.000
CAPACITY
  245.   195.   240.   350.   540.   400.   510.   730.*00000.   550.
FULL
  350.   290.   360.   500.   710.   550.   690.*00000.*00000.   750.
MINIMUM
  450.   370.   470.   670.*00000.   590.*00000.*00000.*00000.*00000.
EMERGENCY
  590.   490.   610.*00000.*00000.*00000.*00000.*00000.*00000.*00000.

RESULTS
R95   3 290 800.000   14.250
CAPACITY
  225.   180.   225.   330.   510.   370.   490.   690.*00000.   520.
FULL
  330.   270.   340.   470.   670.   520.   660.*00000.*00000.   710.
MINIMUM
  420.   350.   440.   590.*00000.   650.*00000.*00000.*00000.*00000.
EMERGENCY
  550.   460.   590.   770.*00000.*00000.*00000.*00000.*00000.*00000.

RESULTS
R100   3 290 800.000   15.000
CAPACITY
  245.   195.   240.   350.   540.   400.   520.   730.*00000.   550.

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```
FULL
   350.    290.    360.    500.    720.    360.    700.*00000.*00000.    760.
MINIMUM
   450.    380.    470.    640.*00000.    700.*00000.*00000.*00000.*00000.
EMERGENCY
   600.    500.    620.*00000.*00000.*00000.*00000.*00000.*00000.*00000.




RESULTS
  R110                   3  290  800.000   16.750
CAPACITY
   300.    240.    295.    430.    650.    480.    620.*00000.*00000.    660.
FULL
   440.    360.    450.    610.*00000.    590.*00000.*00000.*00000.*00000.
MINIMUM
   560.    470.    580.    720.*00000.*00000.*00000.*00000.*00000.*00000.
EMERGENCY
   740.    620.    770.*00000.*00000.*00000.*00000.*00000.*00000.*00000.




RESULTS
  R120                   3  310  770.000   16.700
CAPACITY
   275.    220.    270.    390.    600.    450.    570.*00000.*00000.    610.
FULL
   400.    330.    410.    570.*00000.    670.    790.*00000.*00000.*00000.
MINIMUM
   520.    440.    540.    720.*00000.    800.*00000.*00000.*00000.*00000.
EMERGENCY
   700.    590.    730.*00000.*00000.*00000.*00000.*00000.*00000.*00000.




RESULTS
  R133                   2  325  770.000   19.000
CAPACITY
   275.    225.    275.    390.    590.    440.    560.    770.*00000.    590.
FULL
   410.    340.    420.    570.    800.    630.    770.*00000.*00000.*00000.
MINIMUM
   540.    450.    550.    720.*00000.    800.*00000.*00000.*00000.*00000.
EMERGENCY
   720.    610.    750.*00000.*00000.*00000.*00000.*00000.*00000.*00000.




RESULTS
  R14A                   1  325  770.000   19.750
CAPACITY
   290.    235.    280.    410.    520.    390.    500.    680.*00000.    580.
FULL
   430.    360.    440.    590.    640.    490.    620.*00000.*00000.    700.
MINIMUM
   550.    470.    580.    770.    750.    590.    730.*00000.*00000.*00000.
EMERGENCY
   750.    640.    790.*00000.*00000.    750.*00000.*00000.*00000.*00000.
```

```
RESULTS
  T1A              1  310  770.000   19.500
CAPACITY
  280.   225.   280.   390.   500.   370.   480.   650.*00000.        560.
FULL
  410.   340.   420.   570.   620.   470.   600.   810.*00000.        670.
MINIMUM
  540.   450.   550.   730.   720.   570.   700.*00000.*00000.        790.
EMERGENCY
  710.   610.   740.*00000.*00000.   720.*00000.*00000.*00000.*00000.


RESULTS
  T2A              1  310  770.000   18.000
CAPACITY
  245.   200.   245.   350.   450.   330.   430.   600.*00000.        500.
FULL
  360.   300.   370.   510.   550.   420.   540.   740.*00000.        610.
MINIMUM
  470.   400.   490.   650.   650.   510.   630.*00000.*00000.        710.
EMERGENCY
  530.   530.   660.*00000.   800.   640.   790.*00000.*00000.*00000.


RESULTS
  T3A              1  310  770.000   19.000
CAPACITY
  270.   220.   270.   380.   490.   360.   470.   640.*00000.        540.
FULL
  400.   330.   410.   550.   600.   460.   580.   790.*00000.        660.
MINIMUM
  520.   440.   530.   710.   700.   550.   690.*00000.*00000.        770.
EMERGENCY
  590.   590.   720.*00000.*00000.   700.*00000.*00000.*00000.*00000.


RESULTS
  T4A              1  500  750.000   17.000
CAPACITY
  290.   230.   290.   420.   550.   400.   540.   760.*00000.        630.
FULL
  480.   390.   490.   680.   700.   570.   700.*00000.*00000.        780.
MINIMUM
  590.   570.   720.*00000.*00000.   690.*00000.*00000.*00000.*00000.
EMERGENCY
*00000.   760.*00000.*00000.*00000.*00000.*00000.*00000.*00000.*00000.


RESULTS
  ---
```

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```
133                      1  519  770.000   19.600
CAPACITY
  280.  230.  280.  400.  510.  370.  480.  660.*00000.  560.
FULL
  420.  350.  420.  570.  620.  480.  600.*00000.*00000.  680.
MINIMUM
  540.  450.  560.  730.  730.  570.  710.*00000.*00000.  790.
EMERGENCY
  720.  610.  750.*00000.*00000.  720.*00000.*00000.*00000.*00000.


RESULTS
T54                      1  510  770.000   17.500
CAPACITY
  235.  190.  235.  340.  470.  320.  420.  580.*00000.  490.
FULL
  350.  290.  360.  490.  530.  410.  520.  720.*00000.  590.
MINIMUM
  450.  380.  470.  620.  620.  490.  610.*00000.*00000.  690.
EMERGENCY
  500.  510.  630.*00000.  770.  620.  770.*00000.*00000.*00000.


RESULTS
T7A                      1  310  800.000   19.000
CAPACITY
  280.  230.  290.  460.  510.  380.  490.  660.*00000.  570.
FULL
  420.  350.  420.  570.  620.  480.  610.*00000.*00000.  680.
MINIMUM
  540.  450.  560.  740.  730.  570.  710.*00000.*00000.  800.
EMERGENCY
  720.  610.  750.*00000.*00000.  720.*00000.*00000.*00000.*00000.


RESULTS
T7A1                     1  310  800.000   20.000
CAPACITY
  300.  245.  300.  420.  540.  400.  510.  700.*00000.  600.
FULL
  440.  370.  450.  610.  660.  510.  640.*00000.*00000.  720.
MINIMUM
  570.  480.  590.  780.  770.  510.  750.*00000.*00000.*00000.
EMERGENCY
  770.  650.  800.*00000.*00000.  770.*00000.*00000.*00000.*00000.


RESULTS
T54                      1  310  770.000   19.500
CAPACITY
  230.  225.  230.  390.  500.  370.  480.  650.*00000.  560.
FULL
  410.  340.  420.  570.  620.  470.  600.  810.*00000.  670.
MINIMUM
```

340. 450. 550. 730. 720. 570. 700.*00000.*00000. 790.
EMERGENCY
710. 610. 740.*00000.*00000. 720.*00000.*00000.*00000.*00000.

RESULTS
T9A   1 310 770.000   20.000
CAPACITY
230. 235. 230. 410. 520. 340. 490. 670.*00000. 570.
FULL
430. 360. 440. 590. 640. 490. 610.*00000.*00000. 690.
MINIMUM
350. 470. 570. 750. 740. 580. 720.*00000.*00000. 810.
EMERGENCY
740. 630. 770.*00000.*00000. 740.*00000.*00000.*00000.*00000.

RESULTS
T12A   1 310 730.000   20.250
CAPACITY
230. 230. 280. 390. 500. 370. 480. 650.*00000. 560.
FULL
410. 350. 420. 570. 620. 470. 600. 900.*00000. 670.
MINIMUM
340. 450. 560. 730. 720. 560. 700.*00000.*00000. 780.
EMERGENCY
720. 610. 750.*00000.*00000. 720.*00000.*00000.*00000.*00000.

RESULTS
T13B   2 220 830.000   12.500
CAPACITY
125. 100. 125. 185. 290. 215. 260. 400.*00000. 295.
FULL
190. 145. 195. 260. 380. 290. 370. 520.*00000. 400.
MINIMUM
230. 190. 235. 320. 450. 360. 450. 640.*00000. 490.
EMERGENCY
295. 245. 310. 410. 560. 450. 560. 790.*00000. 610.

RESULTS
T14B   2 350 750.000   19.000
CAPACITY
275. 225. 275. 390. 600. 440. 560. 780.*00000. 600.
FULL
420. 350. 430. 560.*00000. 640. 780.*00000.*00000.*00000.
MINIMUM
350. 460. 570. 750.*00000.*00000.*00000.*00000.*00000.*00000.
EMERGENCY
750. 640. 780.*00000.*00000.*00000.*00000.*00000.*00000.*00000.

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RESULTS
T153   2 350 810.000   20.500
CAPACITY
   340.   275.   330.   470.   710.   530.   670.*00000.*00000.   720.
FULL
   510.   420.   520.   700.*00000.   770.*00000.*00000.*00000.*00000.
MINIMUM
   570.   560.   690.*00000.*00000.*00000.*00000.*00000.*00000.*00000.
EMERGENCY
*00000.   780.*00000.*00000.*00000.*00000.*00000.*00000.*00000.*00000.

RESULTS
T153   3 340 800.000   17.000
CAPACITY
   330.   260.   330.   470.   720.   530.   680.*00000.*00000.   730.
FULL
   490.   400.   500.   690.*00000.   760.*00000.*00000.*00000.*00000.
MINIMUM
   540.   540.   660.*00000.*00000.*00000.*00000.*00000.*00000.*00000.
EMERGENCY
*00000.   730.*00000.*00000.*00000.*00000.*00000.*00000.*00000.*00000.

RESULTS
A13   2 310 780.000   16.000
CAPACITY
   210.   165.   205.   300.   460.   340.   440.   620.*00000.   470.
FULL
   310.   255.   310.   430.   620.   480.   600.*00000.*00000.   650.
MINIMUM
   400.   370.   410.   550.   760.   610.   750.*00000.*00000.*00000.
EMERGENCY
   530.   450.   550.   730.*00000.   790.*00000.*00000.*00000.*00000.

RESULTS
A23   2 220 830.000   12.500
CAPACITY
   125.   100.   125.   185.   290.   215.   280.   400.*00000.   295.
FULL
   180.   145.   185.   260.   380.   290.   370.   520.*00000.   400.
MINIMUM
   230.   190.   235.   320.   450.   360.   450.   640.*00000.   490.
EMERGENCY
   295.   245.   310.   410.   560.   450.   560.   790.*00000.   610.

RESULTS
A33   2 290 770.000   19.000
CAPACITY
   250.   215.   260.   370.   560.   420.   530.   720.*00000.   560.
FULL

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FULL
  390.   320.   390.   530.   750.   580.   710.*00000.*00000.   770.
MINIMUM
  430.   420.   510.   670.*00000.   740.*00000.*00000.*00000.*00000.
EMERGENCY
  550.   560.   680.*00000.*00000.*00000.*00000.*00000.*00000.*00000.

RESULTS
  A43   2 290   750.000   19.250
CAPACITY
  250.   210.   260.   370.   550.   410.   520.   710.*00000.   550.
FULL
  390.   320.   390.   520.   740.   580.   710.*00000.*00000.   760.
MINIMUM
  430.   410.   510.   670.*00000.   730.*00000.*00000.*00000.*00000.
EMERGENCY
  650.   550.   670.*00000.*00000.*00000.*00000.*00000.*00000.*00000.

RESULTS
  A53   2 390   810.000   20.500
CAPACITY
  350.   290.   350.   500.   760.   540.   710.*00000.*00000.   760.
FULL
  550.   460.   560.   750.*00000.*00000.*00000.*00000.*00000.*00000.
MINIMUM
  730.   620.   760.*00000.*00000.*00000.*00000.*00000.*00000.*00000.
EMERGENCY
*00000.*00000.*00000.*00000.*00000.*00000.*00000.*00000.*00000.*00000.

RESULTS
  A63   2 325   810.000   12.500
CAPACITY
  145.   115.   145.   215.   330.   245.   330.   470.*00000.   340.
FULL
  215.   175.   220.   310.   450.   350.   450.   640.*00000.   480.
MINIMUM
  280.   230.   290.   400.   560.   440.   570.   810.*00000.   610.
EMERGENCY
  370.   310.   390.   530.   720.   580.   730.*00000.*00000.   790.

RESULTS
  A73   2 325   840.000   15.000
CAPACITY
  205.   165.   205.   295.   460.   340.   440.   630.*00000.   470.
FULL
  390.   250.   310.   430.   620.   440.   610.*00000.*00000.   650.
MINIMUM
  400.   330.   410.   560.   770.   510.   760.*00000.*00000.*00000.
EMERGENCY
  530.   440.   560.   740.*00000.   900.*00000.*00000.*00000.*00000.

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RESULTS
 A93   2 325 800.000   13.000
CAPACITY
   150.   120.   150.   225.   350.   255.   340.   490.*00000.   360.
FULL
   225.   185.   230.   330.   470.   370.   470.   670.*00000.   510.
MINIMUM
   295.   240.   310.   420.   590.   470.   590.*00000.*00000.   640.
EMERGENCY
   400.   330.   410.   560.   760.   510.   770.*00000.*00000.*00000.

RESULTS
 A11B   2 290 700.000   15.000
CAPACITY
   150.   130.   160.   235.   360.   265.   340.   490.*00000.   370.
FULL
   235.   195.   240.   330.   480.   370.   470.   660.*00000.   500.
MINIMUM
   300.   250.   310.   420.   590.   470.   580.*00000.*00000.   630.
EMERGENCY
   400.   340.   420.   560.   740.   500.   740.*00000.*00000.   810.